NOTICE

All drawings located at the end of the document.

REMEDIAL ACTION, 881 HILLSIDE, 881 EFFLUENT STORAGE TANKS

SPECIFICATIONS AND DRAWINGS

PREPARED FOR

EG & G ROCKY FLATS, INC.
ROCKY FLATS PLANT

NOVEMBER 1990

PREPARED BY

ENGINEERING-SCIENCE, INC.
Denver, Colorado
IN CONJUCTION WITH

THE RALPH M. PARSONS COMPANY
Pasadena, California

ES ENGINEERING-SCIENCE

ROCKY FLATS AREA PLOT PLAN

RULES PERTAINING TO CONTRACTOR'S YARD

1. PERMIT MUST BE DISPLAYED ON OUTSIDE OF TRAILER
2. TRAILER MUST BE TIED DOWN ACCORDING TO EG&G Rocky Flats STANDARD
3. ONLY EG&G Rocky Flats MATERIALS CAN BE STORED
4. TRAILER TIE-DOWNS MUST BE CLOSE TO THE GROUND - NO DIRT OR CONCRETE PILES
5. FUEL STORAGE TANKS MUST BE KEPT SAFE AND APPROVED BY FIRE DEPARTMENT
6. STAIRS MUST BE KEPT SAFE AND TIED DOWN
7. NO HAZARDOUS MATERIALS (OTHER THAN FUEL) ARE TO BE STORED/USED/DISPOSED OF
8. DAMAGED ROADWAYS ARE TO BE REPAIRED
9. PALLETS, EMPTY BOXES, ETC. MUST BE DISPOSED OF
10. NO MATERIALS ARE TO BE STORED DIRECTLY ON THE GROUND
11. ALL MATERIALS ARE TO BE STACKED NEATLY AND TIED DOWN IF SUSCEPTIBLE TO WIND
12. TARPS ARE NOT ACCEPTABLE DURING HIGH WIND PERIODS
13. LONG TERM USE MATERIALS MUST BE WAREHOUSED OR STORED IN A TRAILER
14. NO LOOSE PLASTIC, SHEET METAL, PLYWOOD, ETC. IS ALLOWED
15. ON COMPLETION OF THE CONTRACT, REMOVE CONCRETE BLOCKING, WIRES, CABLES, ETC.
16. THE GENERAL APPEARANCE OF THE AREA AT ALL TIMES MUST BE GOOD.

SECTION 01610
MATERIAL HANDLING AND WASTE DISPOSAL

01611 WASTE DEFINITIONS

Construction projects deal with five types of waste as defined below:

a. Off-site Sanitary Waste -- Routine, non-radioactive, non-hazardous waste acceptable to public landfills. Such wastes include paper, waste cardboard, plastic, metal, wood, glass, garbage (food waste), sand, gravel, concrete, masonry products, and miscellaneous construction debris. Waste materials noted in this paragraph and generated from the buildings identified in the Approved Building List at the end of this Section, shall be considered Off-site Sanitary Waste.

b. On-site Sanitary Waste -- Waste materials described as in paragraph (1.) above, except coming from buildings and areas of the plant not identified in the Approved Building List. Excess excavated materials, asphalt street paving, and waste generated from the exterior of all buildings (even those on the Approved Building List) shall be handled as on-site sanitary waste. Asbestos disposal must be handled as detailed in other sections of the Technical Provisions.

c. Hazardous Waste -- Those waste materials exhibiting a hazardous characteristic (ignitible, corrosivity, reactivity, or toxicity) or are listed in Colorado Hazardous Waste Regulations 5-CCR-1007-3. Examples of hazardous wastes include paint thinners, Freon, Trichloroethene, epoxy and enamel paints.

d. Contaminated Waste -- Those waste materials that contain or are contaminated with radioactive materials.

e. Mixed Waste -- Those waste materials containing both hazardous and contaminated materials.

f. Empty Containers -- Those containers that have met the conditions set forth in 6-CCR-1007-3, 261-7, Colorado Hazardous Waste Regulations, and are therefore not considered hazardous wastes even though they may have contained hazardous or toxic materials at one time. Empty containers shall only be disposed at the Rocky Flats on-site landfill.

01612 GENERAL REQUIREMENTS

a. The Contractor shall closely adhere to the following procedures to assure that all waste generated during construction will be properly dispositioned and disposed.

b. A preconstruction conference will be held with the Contractor immediately after award of the contract. In addition to the standard review of the procedural items, waste handling procedures will be reviewed with the Contractor.

c. Submittals -- The Contractor will be required to submit a Waste Handling Plan for approval by the Buyer before starting construction. This plan will identify the types, location and approximate volume of the different kinds of waste that will be generated, on-site storage locations, permanent disposal sites to be used, and a listing of subcontractors/vendors who will haul or dispose of waste materials.

d. The Contractor shall use returnable containers and packages for all materials and supplies delivered to the jobsite whenever possible. The Contractor shall limit, as much as possible, the amount of waste accumulated during construction.

e. All material and equipment being removed from buildings or exterior building sites, except those identified in the Approved Building List at the end of this Section, shall be monitored by Radiation Monitoring before being removed from the area.

f. The Contractor shall, at all times, keep the work area clean and orderly. All debris, scrap, and rubble shall be removed from the work area as they are created. At the end of each work shift, the work area shall be swept clean and left in a neat and orderly manner. Access routes for other personnel must be kept clear at all times.

g. Installed equipment and materials removed by the Contractor under this contract, and not authorized to be reused in the work, shall remain the property of the Buyer. All such equipment and material shall be properly identified and delivered to the Buyer as directed by the Buyer. The Contractor shall use care in removing salvageable materials and equipment so as not to cause undue damage that may render the equipment or materials unusable.

01613 WASTE DISPOSAL SITES

a. Waste disposal is approved for one on-site location as described below:

Rocky Flats On-site Landfill -- This site is located one mile north of Guard Post 100. The Contractor shall provide for all transportation to this site. No fees are required. Waste materials approved for this site include waste that comes from buildings or areas that are not included on the Approved Building List, but have been monitored by Radiation Monitoring as being non-contaminated, including:

-- Excess excavated material.

-- Asbestos (see technical sections 02080 if applicable).

-- Removed roofing materials containing or mixed with asbestos.

-- Broken asphalt.

-- Empty containers

b. The Rocky Flats On-site Landfill will be open Monday through Friday from 7:45 a.m. to 11 a.m. and 12:30 p.m. to 2 p.m. Clean dirt and broken asphalt may be dumped until 3:30 p.m.

c. Other dumping areas for waste materials may not be used unless written permission is obtained from the Buyer for disposal at other sites.

d. Concrete truck washout will be permitted at the Rocky Flats Landfill as noted on the Area Plot Plan, in a location designated by the Buyer.

01614 SANITARY WASTE DISPOSAL FROM APPROVED BUILDINGS

This subsection identifies the handling of construction rubble and waste that are considered suitable for disposal at the BFI Waste Systems Landfill. Only waste generated from buildings identified in the Approved Building List at the end of this section shall be considered as Off-site Sanitary Waste.

a. The Construction Coordinator will maintain a separate log for each project that identifies each load transported. When a load is ready for offsite transport to the BFI Waste Systems Landfill, the Construction Coordinator will take a sequentially numbered copy of the Master Return Order to the Traffic Department who will then prepare a Bill of Lading authorizing shipment. The Contractor shall allow one hour after the waste is loaded in the transport vehicle for the preparation of documentation authorizing off-site shipment of sanitary waste.

b. The Contractor shall take the Bill of Lading to the Shipping Department in Building 130. The Contractor will sign the Bill of Lading at the time and will retain the Security copy.

c. Plant Security personnel will stop each transport vehicle, as it exits Guard Post 8, and will retain the Security copy of the Bill of Lading for each load before allowing the vehicle to continue on to the BFI Waste Landfill.

d. Off-site Sanitary Waste does not require monitoring by Radiation Monitoring. All other types of waste must be monitored.

e. All waste material delivered to the Contracted Off-site Sanitary Landfill will be disposed in accordance with the terms of that contract.

f. All loads taken off-site must be fully secured and covered. Any additional dumping fees resulting from improper loading and handling shall be paid for by the Contractor.

g. All waste dumpsters furnished by the Contractor shall be locked at all times when not in use. The Contractor shall designate a custodian for each dumpster who is responsible for the collection, control and surveillance of waste deposited in the dumpster.

01615 WASTE SEGREGATION, CONTROLLED RELEASE AREAS

All areas of the plant, other than those identified in the Approved Building List, have the potential to contain multiple types of waste, including on-site sanitary and contaminated waste. This subsection deals with the segregation and disposal of waste from these areas.

The following steps govern the disposition, segregation and disposal of waste as it is generated:

a. The Construction Coordinator will arrange for a site survey by Radiation Monitoring before any demolition or excavation activities begin. This survey will identify potential waste types and identify construction procedures required for other than sanitary type waste.

b. The Construction Coordinator will monitor the Contractor's compliance with his approved plan as well as compliance with all applicable Rocky Flats waste procedures. The Construction Coordinator will assist the Contractor in the identification of waste types, in particular contaminated versus on-site sanitary waste. Any Radiation Monitoring support or other EG&G involvement will be requested and coordinated by the Construction Coordinator.

c. All waste will be segregated and monitored by Radiation Monitoring as it is generated and before loading for transport to a permanent disposal site. The Construction Coordinator will arrange for final monitoring by Radiation Monitoring of each loaded transport vehicle.

d. On-site sanitary waste shall be hauled to the Rocky Flats On-site Landfill.

e. The site survey conducted by Radiation Monitoring will identify low level radioactive and contaminated waste. The Construction Coordinator will also provide direction for the segregation of hazardous wastes. If improper segregation does occur, or mixing of waste types is identified, segregation of on-site sanitary waste will be attempted. If this is not possible, the identified waste load will be handled as the appropriate waste type. Under no circumstances will contaminated or hazardous waste be shipped off-site as sanitary waste.

f. Contaminated waste shall be deposited in waste boxes provided by the Buyer. Disposal of such boxes shall be the responsibility of the Buyer.

01617 HANDLING AND DISPOSAL OF HAZARDOUS WASTE

A. Before bringing a hazardous waste material to Rocky Flats, a Contractor must notify Industrial Hygiene and Hazardous Material Control through the Construction Coordinator. If a Material Safety Data Sheet (MSDS) for the material is not in Hazardous Material Control's master file, the Contractor must provide a copy thereof.

b. The use of the chlorinated solvents 1.1.1 - Trichloroethane (TRIC or Cloroethene VG) and Freon-TF (Genesolv) as cleaners and degreasers has been discontinued at Rocky Flats as of October 1, 1988. There are nonhazardous substitutes available including Alum Oakite NST Cleaner (as a 5% solution in water) and "De-Solve-it". Contact the Rocky Flats Construction Coordinator for the use and disposal of these substitutes or other substitute cleaners and degreasers proposed by the Contractor.

ATTACHMENT I to IL #NORISK.12
DATED FEBRUARY 22, 1989

APPROVED BUILDING LIST
(Revision 2)

331A	020	443
	060	549
T112A	061	551
T121A		
T334B	100	552
T371A	111	553
T371C	112	554
T371D	113	555
T371F	114	556
T371G	115	558
T441A	119	661
T442A	120	662
T452A	121	
T452B	124	675
T452C	127	900
T452D	128	920
T452E	129	931
T452G	130	987
T690A	131	988
T690B	250	993
T690C	333	995
T690D	335	
T690E	428	
T690F	429	
T690G		
T690H		
T690M		

SECTION 1700

CONTRACTOR SAFETY REQUIREMENTS

01701 APPLICATION OF REQUIREMENTS

These safety requirements apply to all contractors performing work under direct contract or subcontract at the Rocky Flats Plant. Contractors shall be responsible for compliance by their subcontractors with the safety requirements of this contract.

01702 CODES AND REGULATIONS

The contractor shall take all reasonable precautions in the performance of the work to protect the safety and health of employees and others and to protect property. Contractors shall comply with applicable Federal, State, and local codes and regulations for safety and health, including, but not limited to:

a. Contract Work Hours and Safety Standards Act of 1969 and subsequent amendments.

   1. Occupational Safety and Health Administration (OSHA) 29 CFR 1926 - Safety and Health Regulations for Construction

b. Public Law 91-596, Occupational Safety and Health Act of 1970 and subsequent Amendments.

   1. Occupational Safety and Health Administration (OSHA) 29 CFR 1910 - Safety and Health Regulations for General Industry

   2. Occupational Safety and Health Administration (OSHA) 29 CFR 1904 - Recording and Reporting Occupational Injuries and Illnesses

c. American National Standards Institute (ANSI) Standards as referenced in OSHA 29 CFR 1926 and 29 CFR 1910

d. National Fire Protection Association (NFPA) Codes as refereńced in OSHA 29 CFR 1926 and 29 CFR 1910

e. Mine Safety and Health Administration (MSHA) 30 CFR 56 (for any

quarrying or crushing activities)

f. The contractor shall be responsible for complying with new or modified industry codes and regulations that apply to this project/contract, as they are promulgated during the term of this contract. Actual expenses incurred as a result of compliance with new or modified codes or regulations will be reimbursed to the contractor.

01703 DESIGNATED SAFETY PERSON

The contractor shall employ at least one person on site having overall safety responsibility and having the authority to perform required safety related duties. This individual may also function as the project superintendent with the approval of EG&G. The designated safety person will be required to attend additional EG&G safety training for this project. The contractor should budget eight (8) hours for this training.

01704 CONTRACTOR'S SAFETY PROGRAM REQUIREMENTS

a. Within 10 working days after award of this contract and before commencing work on the project, the contractor shall submit, to EG&G Construction Management, a copy of the contractor's written health and safety program. The program will be reviewed and approved by EG&G Construction Safety, prior to any contractor on-site activity. The contractor's safety program shall include, as a minimum:

1. Specific procedures, requirements, equipment, and facilities to (1) eliminate hazards, (2) reduce hazards to a minimum, or (3) guard against hazards associated with this project.

2. Provisions for daily project safety inspections to be completed by the designated safety person with hazards found and corrective actions taken recorded in a permanent log. The daily safety inspection log shall be signed by the designated site safety representative. The daily safety log shall be submitted to EG&G upon project completion.

3. Provisions for removing from service any equipment which is found to be in a hazardous condition.

4. Provisions for the immediate reporting of all injury, illness and property damage incidents occurring at the Rocky Flats Plant to the EG&G Construction Coordinator.

5. Provision for the completion of comprehensive incident investigations and reports. All incident investigation reports shall be submitted to EG&G Construction Management for review by EG&G Construction Safety within 24 hours of the

incident. Reporting to EG&G shall be made on EG&G forms available from the EG&G project Construction Coordinator and provided at the pre-construction meeting.

The contractor shall cooperate completely in all Critique Meetings initiated by EG&G to evaluate incidents.

6. Provisions for the submitting of two (2) copies of the OSHA 200 Log on a monthly basis, and two (2) copies of OSHA 200 Summary, at project completion, to the EG&G Construction Coordinator.

7. Procedures for the immediate and subsequent treatment of injured workers. Any contractor employee experiencing any injury or illness on the project shall report as soon as possible to EG&G Medical Department for evaluation. EG&G Construction Management shall be notified whenever an employee reports to medical.

8. Provisions for the training, either site specific or otherwise required, of all contractor employees and associated personnel in the recognition of project hazards. The amount of time to be allotted for the training of contractor and subcontractor personnel, exclusive of job task training, for this project shall be four(4) hours per craft employee and eight(8) hours per supervisory employee.

9. Provisions for the utilization of only those persons adequately trained and competent to operate assigned equipment or perform assigned tasks. Job task training, conducted by the contractor, shall be a part of routine job assignments. Training shall include the recognition of the hazards associated with the operation of assigned equipment or performance of job tasks.

10. Provisions for safety and health meetings ("tool box" meetings) conducted on a weekly basis for all contractor employees. Each meeting shall be approximately one hour in length, occur during working hours, and be specific to the project and shall include, at a minimum, discussions of recent inspection findings and corrective actions, incidents, and up-coming safety requirements. The Construction Coordinator shall be notified 24 hours prior to the safety meeting. Upon completion of the meetings, copies of reports and minutes shall be furnished to the EG&G Construction Coordinator within 24 hours.

11. Provisions for project site posting of EG&G Construction Safety inspection reports.

12. Provisions for five (5) working days advanced notification to the EG&G Construction Coordinator of when equipment will be

brought on site and of special activities, i.e., critical lifts, road closures, confined space entry, hot work welding permits, any power interruptions or outages, etc.

Moving equipment from one project site to another will require the five (5) day advance notice, but flexibility will be extended if equipment is currently approved to be used on plant site. EG&G Construction Management must be notified prior to any equipment move.

13. Provisions for the control of repeat safety violations and violators.

14. Procedures for excellent housekeeping including immediate disposal of all trash and construction refuse. This shall be performed continuously with end-of-day clean-up. A final clean-up shall be completed at the end of the project and prior to the contractor leaving the site.

b. The contractor shall communicate to its employees their safety rights (a work place free of recognized hazards with a procedure to make hazards known to management) and their safety responsibilities (to work in a safe manner). A DOE poster and complaint form, provided by EG&G, is required at all construction sites and construction offices.

c. Contractors, key subcontractors, and their safety personnel shall attend a pre-construction safety meeting and general safety orientation conducted by EG&G. A walk-through inspection for site layout, plans, housekeeping, signs, traffic control, project access control, etc. will be conducted prior to construction start.

d. It is the responsibility of the contractor to orient all employees and subcontractors and their employees, to site safety working conditions and requirements.

e. EG&G will perform random safety checks/inspections of the work site and construction equipment and examine such documents as it may request from the contractor in connection with such safety checks/inspections. The contractor shall cooperate in such checks and inspections.

f. The contractor shall complete all required corrective actions of identified hazards within the designated time frame. The contractor's failure to comply with the issued corrective notices may result in (1) a second notice of noncompliance or (2) a stop work order for all, or part of, the project. If the contractor again fails to complete the agreed on corrective action within the allotted time frame, necessary corrective work may be instituted by EG&G and unilaterally charge the contractor for all costs thereof. Such charges will be deducted from payments otherwise due the contractor.

g. EG&G Construction Management may request the contractor to remove from the work site any employee deemed objectionable. The contractor shall remove, or have removed, from the site:

1. Employees whose actions or activities, either singularly or combined, create an unacceptable hazard to themselves, others, property, or who refuse to comply with the safety requirements of this contract.

2. Contractors or subcontractor's supervisors who are unable or unwilling to manage personnel performance in compliance with the safety requirements of this contract.

01705 STOP WORK ORDERS

a. The contractor shall comply immediately with any stop work orders issued by EG&G through the Construction Coordinator. The contractor shall convey to its supervisors and workers EG&G's authority to stop all when there is an imminent danger to worker's health and safety, imminent danger of property loss, failure to correct a hazardous condition or action in the allotted time frame and instances of repeat safety violations.

b. Work may resume only when the condition or action has been corrected to the satisfaction of EG&G. Written release to resume work will be provided by EG&G Construction Management with concurrence of EG&G Construction Safety.

c. The contractor shall not be entitled to claims for damages for losses incurred, or for an extension of time, as a result of the issuance of stop work orders due to contractor controlled hazardous conditions or actions or for compliance with the safety requirements of this contract.

01706 JOB SAFETY ANALYSIS

a. The contractor shall submit an overall project schedule identifying those events with critical safety impact or requirements or with a high potential hazard to personnel or property. Critical items require a Job Safety Analysis (JSA), which shall be reviewed and approved by EG&G Construction Safety prior to work starting on that critical activity. OSHA publication, "OSHA 3071, JOB HAZARD ANALYSIS", should be used as a guide in preparation of the JSA and is available from EG&G Construction Management.

b. A JSA is the breaking down into component parts of any method or procedure and shall include:

1. A determination of the hazards connected therewith and associated with each step or task.

2. A determination of the requirements or qualifications of those

who are to perform each step of the work.

3. Directions for implementing solutions to eliminate, nullify, or reduce to a minimum the consequences of such hazards.

01707 SITE SPECIFIC SAFETY REQUIREMENTS

EG&G "Site specific" construction safety requirements are those employing Rocky Flats Plant adopted policies, operating directives, plant standards, and codes applicable to this construction project. These requirements include the following and apply to all construction performed at Rocky Flats:

a. All workmen will be required to wear hard hats. All visitors to posted construction areas will be required to wear hard hats.

b. All compaction performed with vibratory equipment will be performed by workmen wearing approved foot protection devices.

c. All contractor personnel will wear shirts that cover the shoulders, long pants, and work shoes on the plant-site. Special protective equipment required to preform specific tasks will be worn when specified and in the proper manner.

d. Ladders

1. Three-legged ladders are not allowed.

2. Aluminum ladders are not allowed for work in areas where there is electrical power equipment.

3. Industrial fiberglass ladders are allowed for all applications.

4. Wooden ladders are not allowed in radiological areas.

e. A lift device known as the "Xtraman Hoist", or any lifting devices where, by design, the operator or any other person is used as the ballast or counterweight of the device is not to be used on construction projects.

f. Safety eye-wear with side shields will be worn at all times. Exceptions are when a passenger in a vehicle with no hazardous exposures, or in an office.

g. Limitations are placed on work activities due to wind speed and weather conditions as determined by the EG&G Construction Coordinator.

h. Prior to bringing ANY chemical on plant site, contact Industrial Hygiene, 966-2780, for compliance directions in RFP Hazardous Communication Program.

i. Medical certifications required for this project will be determined by the Site Specific Safety And Health Program developed for this project. Contractor employees required to have medical certifications shall have the necessary medical examinations completed off-site and at the contractor's expense.

j. Operation Health Physics requirements have been determined by the Site Safety and Health Program developed by the Buyer for this project.

01707

k. Submit a written Site Specific Health and Safety Plan indicating the procedures to be used by the contractor to comply with the Rocky Flats Plant Environmental Restoration Site Specific Health and Safety Program Plan. The Site Specific Health and Safety Plan must be approved by the Buyer prior to start of work.

01708 INITIATION OF WORK

a. All contractor supplied equipment and tools shall be inspected by EG&G Construction prior to use on site. Contractor shall be required to immediately shut down, repair, or remove from the Rocky Flats Plant any equipment not meeting safety codes.

b. Any equipment that has been modified in any way after being brought on site, and receiving the initial inspection, shall be reinspected by EG&G Construction Safety.

c. All construction work requires an EG&G Work Permit, which must be obtained through the EG&G Construction Coordinator and approved by EG&G Construction departments prior to start of any work activities. Additional permits are required for specific activities. All permits will be prepared and obtained by EG&G.

d. The contractor shall immediately notify EG&G Construction Management of any safety related changes to the project.

e. Routine safety meetings involving all contractors performing work at the Rocky Flats Plant will be held to discuss mutual problems, findings, trends, etc. EG&G Construction Management will notify contractors of such meetings. Contractor shall attend regular and other construction safety meetings held by EG&G.

01709 CRITICAL 29 CFR 1926 STANDARDS FOR Remedial Action, 881 Hillside-Effluent Storage Tanks.

The successful contractor will be required to follow all federal, state, and local safety requirements, as well as Rocky Flats plant requirements.

The following is a description of codes for work on Remedial Action 881 Hillside Effluent Storage Tanks and Foundations. This work will be subject to both 29 CFR 1910 and 29 CFR 1926. In particular, the contractor should pay close attention to the following standards. All parts of 29 CFR 1910 and 29 CFR 1926 will be enforced, but the following standards are of special importance to the stated description of work.

29 CFR 1910.134(b)(10)	Requirements for a Minimal Acceptable Program
29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
29 CFR 1910.20	Access to Employee Exposure and Medical Records
29 CFR 1926.103	Respiratory Protection
29 CFR 1926 Subpart "L"	Ladders & Scaffolds
29 CFR 1926.100-104	Personal Protective Equipment
29 CFR 1926.251	Rigging Equipment and Material Handling
29 CFR 1926. Subpart "J"	Welding and Cutting
29 CFR 1926.550	Cranes and Derricks
29 CFR 1926.552	Material and Personnel Hoists
29 CFR 1926 Subpart "R"	Steel Erection

Though special attention must be given to the above standards, that does not relieve the contractor of his responsibility to follow all requirements of 29 CFR 1926 or RFP site safety requirements.

The successful contractor's safety and health plan shall describe how the contractor plans to comply with the indicated 29 CFR 1926 regulations.

01710 POST-CONSTRUCTION ACTIVITIES

The contractor shall submit a final report to EG&G Construction Safety detailing their safety performance during the project. This report shall be submitted within 10 working days after EG&G accepts the project.

SECTION 02200

EARTHWORK

PART I: GENERAL

1.1 APPROVAL: Prior to starting any excavations, an approved excavation permit and written permission shall be obtained from the Buyer.

1.2 PROTECTION AND SAFETY

A. Traffic Control

1. Keep all roads, sidewalks, and parking areas that are not part of this project usable at all times.

2. The Buyer shall provide all necessary barricades, lights, signals, etc., for the protection of the workers and the public, as established by the Occupational Health and Safety Administration (OSHA) Construction Safety and Health Regulation 29 CFR, Part 1926, Subpart G, Signs, Signals, and Barricades.

B. Excavations, Trenching, and Shoring

1. All excavations, trenching and shoring shall comply with the rules and regulations as established by OSHA Construction Safety and Health Regulations 29 CFR, Part 1926, Subpart P, Excavation, Trenching, and Shoring.

2. OSHA Pamphlet 2226, Excavation and Trenching Operations, can be used as an additional aid.

1.3 EXISTING UTILITIES

A. Notify the Buyer immediately when existing utilities are encountered during excavation.

B. Obtain approval from the Buyer before backfilling existing utilities.

PART II: PRODUCTS

2.1 EXCAVATED MATERIAL

A. Material to be excavated is assumed to be earth and other materials that can be removed with a power shovel.

B. If rock is encountered within the limits of excavation, notify the Buyer immediately and do not proceed except as instructed.

C. Contaminated soil should be stockpiled separately from clean soil. Contaminated soil should not be used as fill.

2.2 FILL MATERIALS

A. Fill material for structures and utility trenches shall be granular soils free of organic matter.

B. Sand fill shall pass a 20-mesh and be retained on a 200-mesh U.S. Standard sieve and shall be free of organic material, trash, and debris.

C. Frozen materials shall not be used for fill.

D. All suitable material removed from the excavation shall be used in forming fills. No excavated material shall be wasted without approval of the Buyer.

E. Fill for storage areas and roads shall consist of overburden and bedrock materials, including broken asphalt pavement, obtained from excavated areas.

PART III: EXCAVATION

3.1 GENERAL

A. The worksite and areas shown on the drawings shall be cleared of all natural obstructions and existing foundations, pavements, utility lines, and other items that will interfere with the construction operations, as approved by the Buyer.

B. Proper allowances shall be made for form construction, waterproofing, shoring, and inspection. Where walls or footings are authorized to be deposited directly against excavated surfaces, the surfaces shall be sharp, clean, and true. Bottoms of excavations for footings, piers, grade beams, etc., shall be level, clean, and clear of loose materials.

C. Trenching for utility systems shall be of sufficient width for proper laying of pipe and conduit. The trench banks shall be as nearly vertical as is practical. Undercutting will not be permitted. Trenches shall be of sufficient depth to provide not less than the minimum cover shown on the drawings or 3 ft.

D. Protect bottoms of all excavations from free-standing water and frost. Do not place foundations, footings, grade beams, or slabs on wet or frozen ground.

E. Suitable excavated material that is required for fill under slabs shall be separately stockpiled as directed by the Buyer.

3.2 OVEREXCAVATION

A. All unstable materials encountered below the established elevation of the excavation that will not provide a firm foundation for subsequent work shall be removed as directed.

B. Where the excavation is directed to be made below the established elevations, the excavation, if under slabs, shall be restored to the proper elevation in accordance with the procedure specified for backfilling, or if under footings, the depth of the walls or footing shall be increased as may be directed by the Buyer.

C. Excavations carried below the depth indicated WITHOUT SPECIFIC DIRECTION shall be returned to the proper elevation in accordance with the procedure specified for backfilling, except that in wall or footing excavations, the concrete shall be extended to the bottom of the excavation.

3.3 BACKFILLING

A. Prior to backfilling, remove all forms and clean excavations of all trash and debris.

B. Trenches for piping, conduits, or other underground utilities shall be backfilled to a minimum of 6 in. over the top of the pipe, conduit, cable, etc., with sand fill unless otherwise detailed on the drawings.

C. Fill shall be placed in horizontal layers not in excess of 6 in. in thickness and shall have a moisture content such that the required degree of compaction may be obtained. Each layer shall be compacted by hand or machine tampers or by other suitable equipment to 90% of maximum density as determined by the Modified Proctor Testing Method.

D. Install Buyer-furnished orange warning tape 12 in. above any underground utilities.

E. Spreading Fill Material

1. Completed fill shall correspond to the contours shown on the drawings.

2. Place fill materials in successive layers of loose materials not more than 6 in. deep.

3. Uniformly spread each layer using a road machine or other approved device.

4. Compact each layer of fill thoroughly using an approved roller to obtain 90% maximum density, as determined by the Modified Proctor Testing Method, ASTM D 1557.

3.4 SUBGRADE PREPARATION

A. Subgrade Preparation

1. Rough grade to the approximate final shape of subgrade required.

2. Scarify to a maximum depth of 6 in., and thoroughly cultivate until the material is finely divided.

3. Alternately water and recultivate the subgrade material to obtain the optimum moisture content required for compaction. Minimum depth of moistened subgrade shall be 6 in.

B. Shaping

1. Shape subgrade to a true cross section sufficiently higher than the specified grade to allow for compaction.

2. Rough grading shall be done in a manner that will not leave ridges of material that will interfere with the immediate drainage of water from the subgrade.

3. During shaping and compacting, any high spots or depressions that develop in the subgrade shall be scarified, cut down, or backfilled and compacted as specified below.

C. Wetting and Compacting

1. Furnish sufficient watering equipment to ensure proper moisture content of all materials being placed.

2. Sprinkle each course of material in a manner that will avoid areas of dry material alternated by areas of saturated soil or pools of water.

3.5 PLACEMENT OF FILL ABOVE GRADE

A. Preparation of Ground Surface

1. Where fill is placed over existing pavement or compacted gravel, scarify and compact the existing surface before placing fills.

2. Uniformly moisten areas to receive fill and compact to minimum 90% of maximum density as determined by the Modified Proctor Testing Method.

3.6 COMPACTION

A. Except as otherwise specified, moisture/density relationships will be as determined by the American Society for Testing and Materials (ASTM) D1557, and the degree of field compaction shall be controlled with ASTM D1556 or ASTM D2922. All tests will be taken by the Buyer.

B. The Buyer will pay for any test for soil compaction that passes the requirements of the specifications, but the Contractor shall pay for any soil tests that indicate the soil compaction does not meet requirements of the specifications.

3.7 GRADING

A. Uniformly smooth grade all areas covered by the project, including excavated and backfilled sections, and adjacent transition areas. The degree of finish shall be that ordinarily obtainable from either blade graded or scraper operations.

B. The finish surface shall be not more than 0.15 ft above or below the established grade or approved cross section.

C. All drainage swales shall be finished so as to drain readily.

3.8 DISPOSAL OF DEBRIS AND EXCESS MATERIAL

A. Rubble and debris not suitable for fill shall be transported to a sanitary landfill 1 mile northeast of Access Gate B.

B. Excess material from excavation, unsuitable for or not required for backfilling, shall be wasted, spread, and leveled or graded as directed by the Buyer within 1 mile of the site.

END OF SECTION 02200

SECTION 03100--CONCRETE FORMWORK

PART I: GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03200, Concrete Reinforcement

B. Section 03350, Concrete

1.2 APPROVALS: All concrete formwork complete and in place shall be approved by the Buyer before concrete is placed.

PART II: PRODUCTS

2.1 FORMS

A. Forms for all surfaces shall be made of surfaced lumber, plywood, or material that will provide a surface at least equal to surfaced lumber or plywood.

B. Forms for all exposed surfaces shall be constructed of plywood or an approved equal. Plywood for forms shall be of the grade Exterior B-B (concrete form) conforming to the latest Product Standard for Soft Plywood, Construction and Industrial, of the National Bureau of Standards.

C. Plywood panels shall be not less than 5/8 in. thick.

D. Plywood less than 5/8 in. thick otherwise conforming to the requirements specified herein may be used with a continuous backing of 3/4-in. sheeting.

E. Metal forms shall be approved by the Buyer.

2.2 MISCELLANEOUS MATERIALS

A. Form Coating--A colorless mineral oil similar to Horn's form film.

B. Form ties shall be adjustable in length and be so constructed that no metal will be within 1 in. of finished surfaces after form removal. Wire ties shall not be used where the concrete will be exposed to weathering or to view.

PART III: EXECUTION

3.1 DESIGN REQUIREMENTS: Formwork shall be designed and erected by the Contractor in accordance with the American Concrete Institute (ACI) Recommended Practice for Concrete Formwork (ACI Standard 347) and in accordance with the following:

SPECIFICATIONS AND DRAWINGS
FOR
GOVERNMENT FURNISHED EQUIPMENT
EFFLUENT STORAGE TANKS AND FOUNDATIONS

REMEDIAL ACTION 881 HILLSIDE, 881
ROCKY FLATS PLANT
GOLDEN, COLORADO

Prepared for:

EG&G ROCKY FLATS, INC.

November 1990

Prepared by:

ENGINEERING-SCIENCE, INC.
DENVER, COLORADO

In Conjunction With

THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

"REVIEWED FOR CLASSIFICATION
By T.F. Bullock
Date 8-15-90"

R1-8-25

SECTION 01100
SPECIAL CONTRACT REQUIREMENTS

01101 LOCATION OF WORK

The work covered by this contract will be performed at the Rocky Flats Plant, near Golden, Colorado. (See Location Map and Area Plot Plan the end of Section 01500.) This facility is one which is owned by the Government and operated on behalf of the DOE by EG&G Rocky Flats, Inc.

01102 SCOPE OF WORK, PERFORMANCE OF WORK BY CONTRACTOR

This contract covers the furnishing of all plant, labor, equipment, supplies and materials, and performing all work in strict accordance with the terms of the contract.

The scope of this work includes design and construction of three welded steel, double wall, 159,000 gallon effluent tanks and their foundations. The tanks shall be designed to store demineralized treated water effluent from the ion exchange/UV/peroxide treatment system at 881 Hillside Remedial Action.

The Contractor will be required to interface with and coordinate with other facilities which have been constructed under other Phases of 881 Hillside Remedial Action. These include:

Phase IA and IB Construction

- Pre-engineered Building 891 and foundation.
- Influent storage tanks and foundation.
- Water supply pipeline, sewer pipeline, natural gas service pipeline, electrical service and telephone service to Building 891.
- Building 891 HVAC, plumbing and electrical.

Phase IIA Construction of the 881 Hillside Remedial Action project includes the following facilities:

- Process treatment system, including electrical and controls.
- Indoor and outdoor transfer piping.
- Tank electrical and controls.
- Chemical storage and transfer facilities.

- Completion of Building 891 electrical and outdoor lighting.

- Installation of a UV/peroxide treatment unit and ion exchange treatment system, which are Government Furnished Equipment under separate contract.

In addition, the following construction activities will be performed under Phase IIB of the project and are not a part of this work:

- Influent collection gallery, sumps, wells, pipeline, and electrical.

- Effluent discharge line and structure.

- Final grading and landscaping.

The Contractor shall perform on the site and with his own employees work equivalent to at last 15% of the total dollar amount of work to be performed under the contract, not including the cost of materials. If during the progress of the work hereunder, the Contractor requests a reduction in such percentage and the Buyer determines that it would be to the Buyer's advantage, he may, in writing, authorize a reduction.

01103 CONTRACT DRAWINGS AND SPECIFICATIONS

The Contractor will be furnished, without charge, 10 sets of specifications and half-sized drawing and one full-size set of reproducibles. The drawings which constitute a part of the contract documents are as indexed at the end of these specifications.

The Contractor shall observe and so caution any Sub-contractor, that the scales on the half-sized drawings are not necessarily correct and may not be directly usable for material take-offs.

01104 ABBREVIATIONS

Abbreviations contained in various sections of the specifications refer to the following organizations, societies, associations, standards, publications terms, etc.

ANSI	American National Standards Institute
ASNT	American Society for Nondestructive Testing
AWWA	American Water Works Association
UBC	Uniform Building Code

01105 SECURITY MEASURES

a. The Contractor shall furnish to the Buyer a letter listing all contractor organizations; any deviations from the normal workday or workweek at the Rocky Flats Plant; The Contractor shall fill out a gate pass form (RF-34660)

furnished by the Buyer for all Contractor and Subcontractor personnel requiring access to specified construction areas. Access will be granted for the period of performance of work. The Buyer shall be notified of the termination of employment of individuals submitted for access. The Buyer reserves the right to exclude from the worksite any employee as deemed appropriate. Access to the plantsite will not be granted to persons who are not citizens of the United States of America.

1. When the duration of construction is 30 days or less, the Buyer shall issue each Contractor individual nonpicture security badges (passes) and parking permits for access to the plant. These badges and parking permits are accountable property of the U.S. Government and shall be returned to the designated gate at the end of each day.

2. When the duration of construction is 30 days or more, the Buyer shall issue each Contractor individual picture security badges (passes) and parking permits for access to the plant. These badges and parking permits are accountable property of the U.S. Government and shall be returned upon the completion of the project.

3. The failure of the Contractor to return all badges and parking permits could result in a delay of contract closing and the withholding of $500 from the final payment for each missing badge and parking pass.

4. The Buyer's Subcontract Administrator shall be notified immediately of any missing or lost badges and parking permits.

5. The Buyer's Plant Protection Department will immediately report to the Buyer's Subcontractor Administrator any individual nonpicture security badge and parking permit not returned to the designated gate at the end of the day.

b. The work under this contract will be performed in security areas and Contractor employees will be subject to security controls required by the DOE. Contractor employees who possess a DOE personnel security clearance will be permitted access to the security areas under special controls. The Contractor shall arrange for access with the Buyer.

c. No uncleared Contractor personnel will be permitted within security areas without security escorts. These escorts will be furnished at no cost to the Contractor: however, a 24-hour advance notice of the Contractor's access requirements is necessary.

d. The Contractor shall schedule his work so as to minimize the number of security escorts required.

e. "Q" Access Authorization Requirements

Personnel with "Q" access authorization will be required for inside the Building 881 area fence. No "Q" access authorization will be required for construction of the effluent storage tanks.

01106 HEALTH SCIENCES MEASURES

a. All of the work under this contract will be performed in areas subject to Rocky Flats H&S rules and regulations as specified below.

All persons requiring access to these areas will be subjected to lectures and administrative actions which are estimated to take approximately 16 hr per man. All costs for the time involved as a result of these actions shall be borne by the Contractor, whether it involves more or less time than that estimated above.

b. Reimbursement for Equipment Retained by the Buyer

1. Tools and equipment shall be monitored prior to being removed from construction areas.

2. Any tools or equipment which are determined by the Buyer to be unsuitable for future use after having been monitored by the Buyer's Radiation Monitoring personnel will be retained by the disposition made by the Buyer.

3. Reasonable compensation will be made for any tools or equipment which are retained by the Buyer. The Contractor shall immediately notify the Buyer in writing of the value which he places on the tools and/or equipment and the basis for such valuation.

c. Specific Requirements

1. Inside Tanks during Welding and Painting Operation.

Working personnel working inside tanks during welding and painting shall be required to wear protective equipment furnished by the Government, consisting of:

a. Respirators.

b. In order to comply with the requirements of ANSI Z88.2, 1980, paragraph 3.5.3, a current medical statement (within the last year) is required approving physical suitability of contractor personnel that will be required to wear respiratory protection equipment. A physician's approval must be presented in writing prior to the time the person is to be fitted for the respirator.

   Personnel shall be fitted with a respirator and indoctrinated in using a respiratory by Industrial Hygiene. About 1 hour is required for each activity with Industrial Hygiene, Respiratory Protection Program, at least 1 week in advance.

2. Protective equipment required for Contractor's nonworking supervisory personnel entering the tanks for short periods will be shoe covers, respirators, safety glasses, smocks, and dosimetry badges. Safety glasses shall be required for all personnel on the jobsite.

3. All persons required to wear protective clothing will be required to take a shower at the close of each work day in shower facilities provided by the Buyer. Towels and lockers will be furnished by the Buyer.

4. Food, beverages, and tobacco are not permitted in the construction areas of this project.

5. Radiation Monitoring coverage will be provided by the Buyer on an as-required basis, except that a radiation monitor will be present during all excavation, demolition, or removal operations.

6. The Buyer will furnish lockable waste boxes to the construction site for the disposal of materials that are determined to emit radionuclides. The Contractor shall place materials so designated in these boxes. Waste boxes will be kept locked and stored inside buildings.

7. No pregnant females shall be permitted in radiation controlled areas.

8. A continuously recording anemometer, with high level audible alarm and warning light set at 15 mph, will be required during excavation activities.

9. Personnel Training and Safety

a. General

1) The Contractor shall familiarize personnel with emergency preparedness measures, information concerning the nearest medical facility and the location of a phone or radio contact to summon emergency assistance. This information shall be posted in a weather protected manner at the access control points or other locations approved by the Buyer.

2) The Contractor shall hold weekly "toolbox" safety meetings to familiarize site employees with anticipated hazards, safety deficiencies, and new approaches to employee protection. Documentation of such meetings shall include subjects discussed, persons in attendance, and suggestions made. A safety orientation meeting shall be held prior to the commencement of work, to inform employes of the specific hazards associated with job requirements. Records of these meetings shall be submitted to the Buyer monthly.

b. Hazardous Waste Site Training

1. Any individual who will work on controlled areas of the site, whether due to contaminated materials or other identified hazards, is required to attend a 40-hour Hazardous Waste Site Training Course (per the requirements of OSHA 29 CFR 1910.120). Supervisory personnel are also required to attend an additional 8 hours of training. This training will not be provided by the Buyer and is at the Contractors expense. Proof of this training shall be furnished to the contractor prior to the start of ay work on site. Casual observers and visitors escorted by training employees ar not required to attend this training.

2. In addition to the initial Hazardous Waste Site Training, each employee shall complete a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. The supervised field experience shall be documented.

3. Employees who may be exposed to unique or special hazards shall be provided additional training. The level of training provided shall be consistent with the employee's job function and responsibilities.

4. Refresher Hazardous Waste Site Training is required on an annual basis.

c. Hazard Communication/Site Specific Worker Protection Training.

1. Prior to initiation of Contractor work on the site, all Contractor employees, and lower-tier Contractors and their employees, shall attend a 6-hour Hazard Communication/Site Specific Worker Protection training session conducted by the Buyer (per the requirements of OSHA 29 CFR 1910.1200). This training session is intended to familiarize the employee with special safety practices that must be observed, and to answer any employee questions relative to employee safety and health. The training session shall be documented and all persons in attendance shall take a written examination covering the material presented.

2. Only persons who have successfully completed such an examination shall be admitted to the work site. For those who failed the exam, retraining will be required.

3. Refresher Hazard Communication/Site Specific Worker Protection training is required on an annual basis.

4. The 6-hour training sessions will be conducted on an as-needed basis by prior arrangements with the Buyer. The Contractor shall notify the Buyer, no later than ten (10) days in advance, of requests for training sessions and the number of workers to attend the session.

d. Rocky Flats Plant Health, Safety, and Environment Training

All persons requiring access to the site will be subject to lectures and administrative actions by the Buyer, which are estimated to take approximately 16 hours per man. All costs for the time involved for such actions shall be at the Contractor's expense, whether it involves more or less time than estimated.

10. Contamination Health and Safety Requirements

a. Occupational Medical Examination

Prior to work on the site, all personnel must have a physical for hazardous waste workers which meets he requirements as addressed in SARA and OSHA. The physical examination must have been in the last 12 months and included a medical screening for the use of respiratory protective devices. In addition, all workers will be required to have heavy metals blood and urine screening. Frequency of the screening will be prior to start of work, yearly at the request of the Buyer, and at end of the job. The Contractor shall provide to the Buyer a signed statement from the physician certifying that the employee has had the required medical examination and is fit for hazardous waste site work prior to work on the site. The statement shall include any work restrictions required by the physician.

b. Air Monitors

Certain workers at the site may be required to wear portable, lightweight air monitors to evaluate the concentrations of particulates generated in the course of work performance. Where such monitors are required, the Buyer will so inform the Contractor and will assist workers with respect to device use. The air monitors will be provided by the Buyer and will be collected at the end of each workday.

c. Work Clothing

Adequate dress for personnel on the site shall consist of the following:

1. Full-length trousers/slacks/jeans.

2. Sturdy work shoes or boots, footwear meeting the requirements of ANSI Standards Z41, where heavy objects must be worked with or lifted.

3. Shirts that cover the shoulders, with sleeves at least T-shirt length. Tank tops, shirts cut off at the midriff, cutoff pants, moon boots, sandals, sneakers, and jogging shoes are considered unacceptable dress and will not be permitted at any Buyer-controlled work site.

4. Hard hats that meet the requirements of ANSI Standard Z-89.1.

5. Safety glasses with side shields that comply with requirements of ANSI Standard Z-87.1.

d. Access Control Points.

1. Access to controlled areas shall be controlled through a designated Access Control point. Workers leaving the controlled area shall be monitored for contamination under the direct supervision of the on-site Radiological Protection Technologist. Workers shall decontaminate their work clothes and/or wash their faces and hands if necessary as directed by the appropriate Health and Safety Representative of the Buyer.

2. Emergency phone numbers, route to site medical facilities and the OSHA poster shall be prominently posted at the Access Control Point by the Contractor.

3. If decontamination of clothing does not adequately remove contaminated material, the Buyer will provide the wearer with a clean pair of coveralls, and will have the contaminated clothing cleaned. In the event that the clothing cannot be satisfactorily cleaned, the Buyer will reimburse the Contractor for the value of the item if the worker was in compliance with contamination control requirement for the site at the time of the incident.

D. Confined Space Entry Requirements.

All personnel entering confined spaces shall adhere to H&S Section 6.04.

01107 PLAN OF OPERATIONS

There will be no stipulated sequence of construction. The Contractor shall arrange his schedule such that, when work is started, work will proceed promptly and vigorously to completion. The Buyer may require the Contractor to show satisfactory proof that materials, equipment, workers, etc., are or will be available as required to complete the work without undue delay. Normal working hours for Contractor shall be 8:00 a.m. to 4:00 p.m. unless otherwise noted.

01108 HEALTH AND SAFETY

In addition to the requirements of Special Provisions No. 3 and GP-56, the following safety items will be emphasized and enforced:

a. Ladders

1. No three-legged ladders will be allowed.

2. No wooden ladders will be allowed.

3. Aluminum ladders will not be allowed for work in areas where there is electrical power equipment or in Building 891.

4. Industrial fiberglass ladders will be allowed.

b. All contractors shall comply with NFPA 241 (Safeguarding Building Construction and Demolition Operations).

c. All workmen will be required to wear hard hats. All visitors to posted construction areas will be required to wear hard hats.

d. All compaction performed with vibratory equipment will be performed by workmen wearing approved foot protection devices.

e. All Contractor personnel will wear shirts, long pants and safety shoes on the plantsite.

f. A lift device known as the "Xtraman Hoist" or any lifting devices where, by design, the operator or any other person is used as the ballast or counterweight of the device is not to be used on construction projects at the Rocky Flats Plant.

g. Smoking restriction shall be as posted.

h. Safety meetings shall be held weekly.

i. Appropriate respiratory protection shall be required during all welding and painting operations inside tanks. Respiratory protection during painting will be based on guidance from the Industrial Hygiene Department and in conformance with ANSI Z88.2 (current edition).

01109 MEDICAL RADIOISOTOPE PROCEDURES ON CONTRACTOR PERSONNEL

All persons engaged in construction at the Rocky Flats Plant are required to report any diagnostic or therapeutic treatment with radioisotopes to the Buyer. Personnel should report prior to treatment, if possible, or immediately after such treatment before they return to work.

01110 ROOF PROTECTION

Personnel requiring access to the roofs of various buildings or tanks shall comply with the following requirements:

a. Temporary walkways will be installed to and around any work areas.

b. Material will not be set on the roof surface unless suitable protection is provided for the roof surface.

c. All scrap and excess material must be removed daily when the work or exercise is complete.

d. All workers on the top of the tanks shall be secured with lifelines per OSHA 1926.104 during construction activities.

01111 PRIVATELY OWNED RADIO PAGERS

Security regulations do not allow the use of privately owned radio pagers at the Rocky Flats Plant except in areas designated as "controlled," such as the warehouse, maintenance shops, garage, etc. Pagers must also be left in privately owned vehicles when entering any area that is not a "controlled" area.

01112 HOLIDAY WORK CURTAILMENT

During the holiday periods covering the days April 13, 1990, May 28, 1990, July 4 1990, September 3, 1990, November 22, 1990 through November 23, 1990 and from December 25, 1990 through January 1, 1991, Construction Contractor activities will be suspended. Contractors and their Subcontractors shall plan their work accordingly. Access to the plantsite during these time periods will be by special arrangement with the Buyer only.

01113 USE OF FIRE RETARDANT MATERIALS

The Contractor shall use fire retardant materials in construction which are specified in applicable divisions of Technical Provisions.

END OF SECTION 01100

SECTION 01300
SUBMITTALS

01301 GENERAL (Refer to GP-59)

a. Descriptive submittals shall be made for all items of equipment set forth in the tables at the end of this section or such other items as may be identified during the design phase of the Contract. Submittals marked with an asterisk must be in reproducible form, the same size and scale as the Contract drawings, or as directed. The Contractor shall submit eight complete sets for each submittal item, except fire equipment items which will require ten complete sets.

b. Omissions of items from the submittal table does not relieve the Contractor from the responsibility for submitting vendor data for any other applicable items that would normally require such submittals. The most closely related item listed will govern the type of submittals required.

c. If required, samples and descriptive data shall be submitted, within the time specified in these specifications, or if no time is specified, within a reasonable time before use to permit inspection and testing; and shall be delivered as specified in these specifications and shall be properly marked to show the name of the material, trade name of manufacturer, place of origin, name and location of work where the material represented by the sample is to be used, and name of Contractor submitting the sample. Samples not subject to destructive tests may be retained until completion of the work, but thereafter will be returned to the Contractor, if he so requested in writing, at his own expense. Failure of any samples to pass the specified requirements will be sufficient cause for refusal to consider further any samples from the same manufacturer whose materials failed to pass the tests.

d. Catalogs for submittal shall have unrelated pages removed with capacities and specified parameters relating to the item or items clearly marked.

e. All items which form a system or subsystem that must be reviewed simultaneously because of coordination requirements shall be submitted concurrently.

f. The Contractor shall also furnish the Buyer with five copies of instruction books covering handling, storage, installation, operation, maintenance, and spare parts provisioning for any equipment being furnished under this contract. These instruction books will be required 30 days prior to shipment of the equipment.

g. If the Contractor fails to submit for approval the required data within the specified time, the Buyer will select a complete line of materials and/or equipment. If the Contractor submits for inclusion in the work materials and/or equipment not in accordance with the specifications, the Buyer will have the right to reject them and select a full line of materials and/or equipment. The selection made by the Buyer will be final and binding, and the items shall be furnished and installed by the contractor without change in the contract price.

h. All submittals shall be correct to Buyer requirements prior to the completion of the project and turned over to the Buyer.

i. Each submittal of drawings and data by the Contractor shall be accompanied by a letter of transmittal giving list of number, titles of drawings, status (Revision Number and Date), action to be taken, and five properly executed copies of the Drawing Transmittal Form attached hereto.

Address to: EG&G Rocky Flats, Inc.
Rocky Flats Plant, Building 131
P. O. Box 464
Golden, Colorado 80401-0464

j. Contractor shall further supplement the transmittal letter, if necessary, with other needed data clarifications. All prints, reproducibles, and material submitted shall be stamped with the transmittal number. The Buyer will furnish blank copies of drawing transmittal forms for use by the Contractor.

01302 SPECIFIC REQUIREMENTS

a. General:

The Contractor shall furnish the following approval and final data. Each document shall be clearly identified with the Buyer's purchase order number and project number.

b. Approval Data:

1. Three complete sets of design calculations and fabrication drawings shall be submitted and one set returned approved by the Buyer before purchase of materials or fabrication. The Buyer's approval shall not relieve the Contractor of his responsibility for the design, drawing accuracy, quality of workmanship, and conformance to this Specification.

2. Three copies of a weld map indicating welding procedures and NDE method used for each fluid containing weld must be submitted and approved before start of fabrication.

3. Three copies of the welding procedures and qualification records shall be submitted.

4. Three copies of the welder qualifications records for the welders to be used.

c. Final Data:

1. The following listed data shall be furnished as five separate booklets, and any pertinent data not listed shall be included:

a. Five complete sets of "as-built" fabrication drawings and calculations.

b. Five sets of material mill test reports and/or certifications.

c. Five sets of all NDE test reports.

d. One set of radiographs (furnished in first booklet only).

e. Five weld maps.

f. Five Manufacturer's Data Reports.

g. Five stress-relieving charts (if applicable).

h. Five sets of applicable welding procedures.

i. Five sets of applicable welders qualifications.

d. Material Safety Data Sheet:

All hazardous materials shall include an MSDS.

01392 REVIEW OF SUBMITTALS

a. After receiving submittals, the Buyer will promptly examine the drawings and/or data only for general arrangement, general dimensions, and suitability and will approve them or return them with comments. This approval shall not relieve the Contractor of his responsibility for sufficiency of detail, design, or correctness of detailed dimensions.

b. Approval of descriptive submittals will not relieve the Contractor of the responsibility for correcting any errors which may exist or for meeting requirements of the specifications. No partial submittals will be accepted.

c. The Buyer will return reviewed submittal data to the Contractor within ten working days after receipt of each submittal. The Contractor shall schedule sufficient time in the procurement process for such review.

d. Within 10 days of receipt of returned submittals with comments, the Contractor shall revise and resubmit for approval in the same quantity and in like manner stated above.

LEGEND

a. Shop Drawings
b. Catalog Data
c. Equipment List
d. Material List
e. Elementary Diagrams and Wiring Diagrams
f. Installation Instructions
g. Maintenance Instructions
h. Operating Instructions
i. Samples, Colors
j. Certifications
k. Performance Curves
l. Design Data
m. Recommended Spare Parts Lists
n. Computations
o. Theory of Operation
p. Demolition Procedure

SUBMITTAL TABLE

Waste Handling Plant (see Section 01702, Paragraph C.)

e. The Contractor shall submit all forms, data, information, certificates, schedules, etc., as required in other sections of the specifications. Omission of an item from the above tabulation does not relieve the Contractor from the responsibility for submitting the item required.

f. Complete submittals are required for all items of equipment or materials submitted for "as-equal" consideration. If the Contractor submits a letter stating that he is installing the exact material, equipment, or model number called out in the specifications, no submittal is required.

END OF SECTION 01300

	a. Shop Drawings	b. Catalog Data	c. Equipment List	d. Material List	e. Elementary Diagrams & Wiring Diagrams	f. Installation Instructions	g. Maintenance Instructions	h. Operating Instructions	i. Samples, Colors	j. Certifications	k. Performance Curves	l. Design Data	m. Recommended Spare Parts List	n. Computations	o. Theory of Operation	p. Demolition	q. Weld Maps, Procedures	r. NDE Test Reports, Radiographs	s. Other
Effluent Storage Tanks	x			x					x	x		x		x			x	x	
Effluent Storage Tank Foundations	x		x							x		x		x					
Waste Handling Plan (See Section 01612c)																			x
Health & Safety Program (See Sect. 01704a)																			x
Project Schedule (See Section 01706a)																			x
Job Safety Analysis (See Section 01706a)																			x
Effluent Storage Tank Test Plan (13208)																			x
Concrete Reinforcing (See Sect. 03200)	x																		
Concrete Mix Design (See Section 03300)												x							
Paint (See Section 09900)		x							x										
Hazardous Materials (All)																			x

SECTION 01500

TEMPORARY FACILITIES, CONTROLS, AND SPECIAL PROJECT REQUIREMENTS

01501 FIRE PROTECTION SYSTEMS

The Contractor shall be responsible for fire protection for his own vehicles, facilities, and equipment.

01502 TEMPORARY FIELD OFFICE

The Contractor will not be required to furnish and maintain field office facilities for the Buyer; however, he shall provide for his own field office requirements if needed.

When a Contractor provides a temporary office or storage facility that is either a trailer or a portable building, a "Contractor Yard/Trailer Use Permit", see pages 01500-6 and 01500-7, must be completed and submitted to the Construction Management Inspection Manager for approval and issue.

A trailer or portable building will be located near the construction site at a location designated by the Buyer, and must be secured in accordance with the Standard for Trailer Anchorage on page 01500-3.

01503 GOVERNMENT-FURNISHED PROPERTY (Refer to GP-62):

The Buyer will not furnish to the Contractor any property to be incorporated or installed in the work or used in its performance.

01504 AVAILABILITY OF UTILITIES AND SERVICES (Refer to Special Provision No. 7 and GP-79)

a. Water and electricity to complete construction of this contract work will be made available to the Contractor within 100 ft of the jobsite for work within existing buildings. For work conducted outside existing buildings, water and electricity will be made available at the nearest building or where designated by the Buyer.

b. The Buyer's Construction Management Department will designate a parking area for the personal cars of the Contractor's employees. These cars must remain parked at the designated area throughout the working day. Only the Contractor's working vehicles will be permitted to be driven on the plantsite except before starting time and after quitting time.

c. For interior work, Construction personnel can use toilet facilities adjacent to the work areas. for exterior work, the Contractor shall furnish toilet facilities for his personnel.

d. All 120-V, single-phase, 15- and 20-A receptacle outlets, serving tools, or equipment being used outside of buildings

shall be equipped with ground-fault circuit interrupters. Such interrupters shall be furnished by the Contractor. This requirement will be strictly enforced.

01505 TESTING (Refer to Special Provision No. 9)

a. If it is provided in the technical sections that a test is to be performed at Buyer expense, costs of any such test which reveals that the contract requirements have not been met will be paid by the Contractor and not the Buyer.

b. The Contractor shall cooperate with the Buyer and any testing organization selected by the Buyer in the preparation for the performance of any test to be conducted by the Buyer or any testing organization selected by the Buyer.

c. If it is provided in the technical specifications that the Contractor is to perform field radiography of welds, the following shall apply:

1. Personnel performing radiography shall be certified per SNT-TC-1A.

2. Prior to starting such work, the Contractor shall present to the Buyer for his approval written procedures regarding:

(a) The handling and use of the radioactive source on the plantsite and

(b) The operational methods to be followed in performing the field radiography.

01506 WORK PERMITS

At least 24 hr prior to the start of any excavation or welding, the Contractor shall request the appropriate work permit from the Buyer. In addition, a Confined Entry Permit will be required for construction activities inside the effluent storage tanks. For excavations involving installation of buried utilities, including electrical and alarm systems, metallic-coated plastic detector tape will be issued as GFE to the Contractor to be installed approximately 12 in. directly above the buried utility or as directed by the Buyer.

01507 UTILITY OUTAGES

The Contractor shall furnish the Buyer 48 hr advance notice of any planned utility outage.

01508 LIGHTING PROTECTION

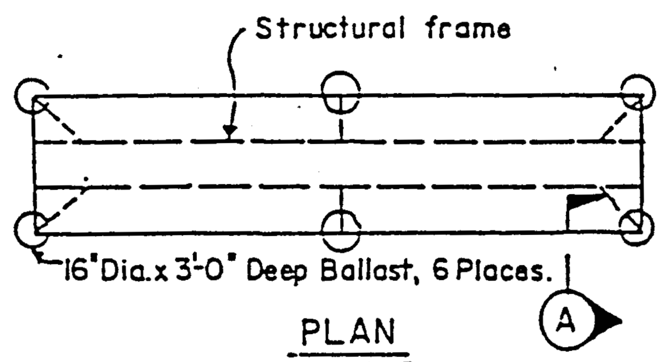
Lightning protection systems for the tanks shall be constructed as part of a separate contract.

Trailers will have the following minimum anchorage measures taken to insure stability during high winds.

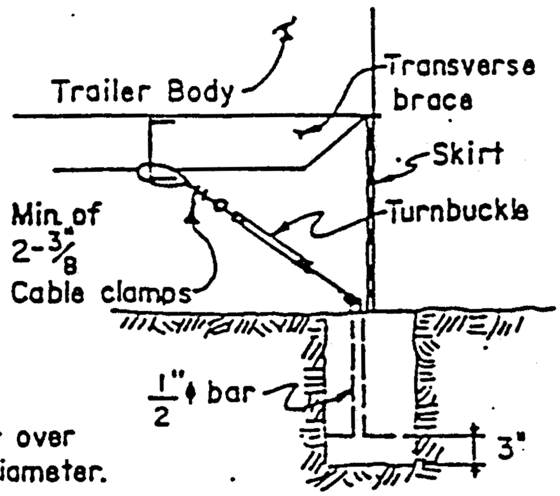
1. Long direction of trailer located in an east-west direction.
2. Located immediately east of an existing structure.
3. Base of trailer blocked up with 8"x 8"x16" concrete blocks to the working elevation and tied down per sketch. Blocks will be placed at each tiedown point shown on the sketch.

"If for any reason measures 1 thru 3 cannot be followed, further analysis will be required by Engineering & Construction."

4. The Building Supt will be responsible for inspection of Trailer blocking and tiedown integrity a minimum of twice a year, with assistance from Safety if required.
5. When the usual internal walls are going to be removed, in order to provide an open work space, a check with Engineering must be made to determine the need for additional internal bracing.



PLAN
NO SCALE



SECTION "A"
NO SCALE

(1) Loop 3/8" Wire rope thru 1" holes in frame or over frame then loop thru turnbuckle of same diameter.

(2) Turnbuckle fastened to 1/2" ϕ Anchor embedded in 16" dia. x 3'-0" deep concrete ballast 6 places.

(3) Locate all holes and or loops within 4" of transverse member.

ROCKY FLATS PLANT STD

Issue	Description	Apprd.	Apprd.	Date	By	Apprd.	Class.
A	ORIGINAL ISSUE	[illegible]		2-20-7?	WGL	[illegible]	[illegible]
		SAFETY		Design Engrg. Dept.			

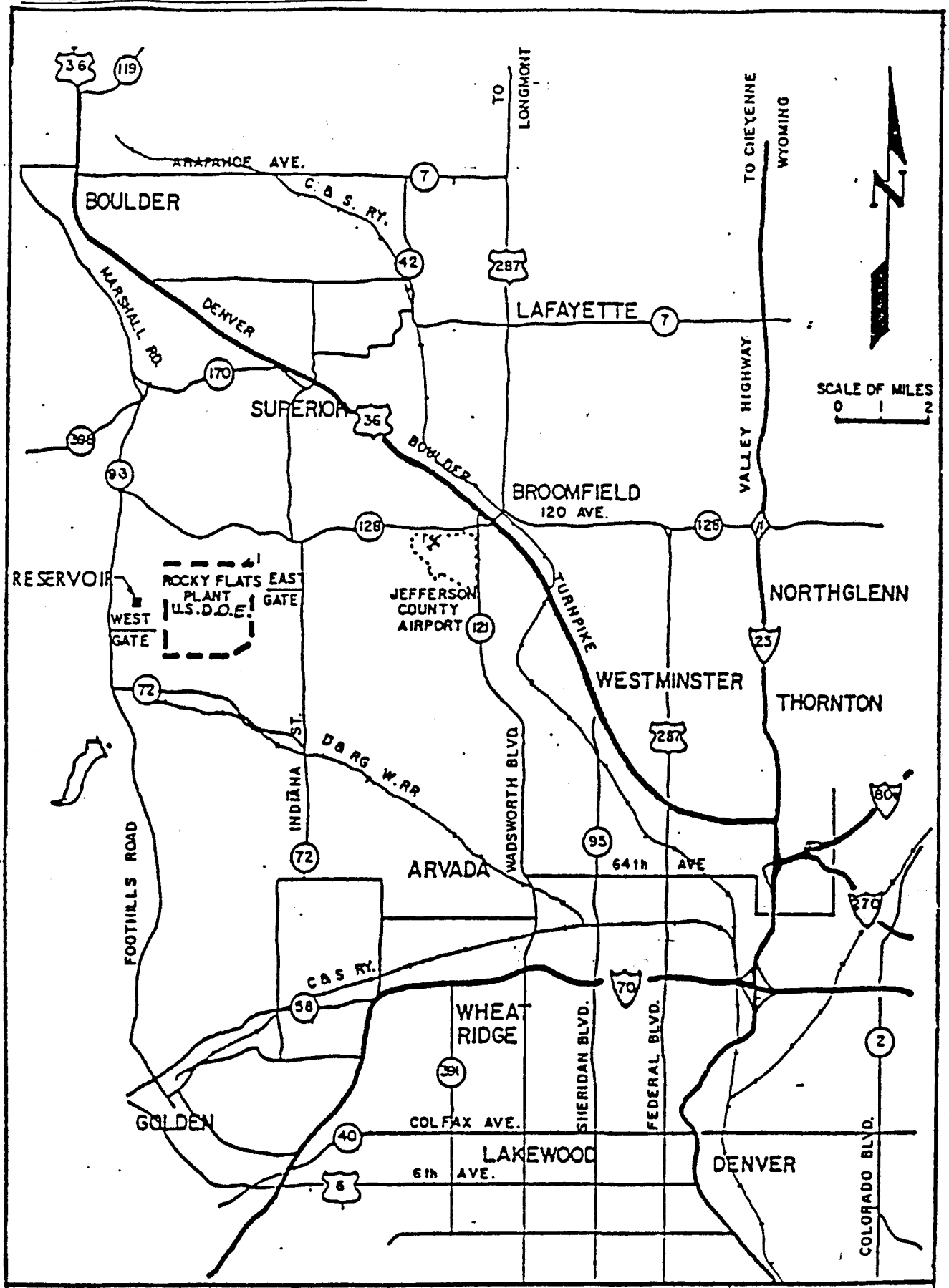
STANDARD FOR:
TRAILER ANCHORAGE

Rocky Flats Plant
GOLDEN, COLORADO

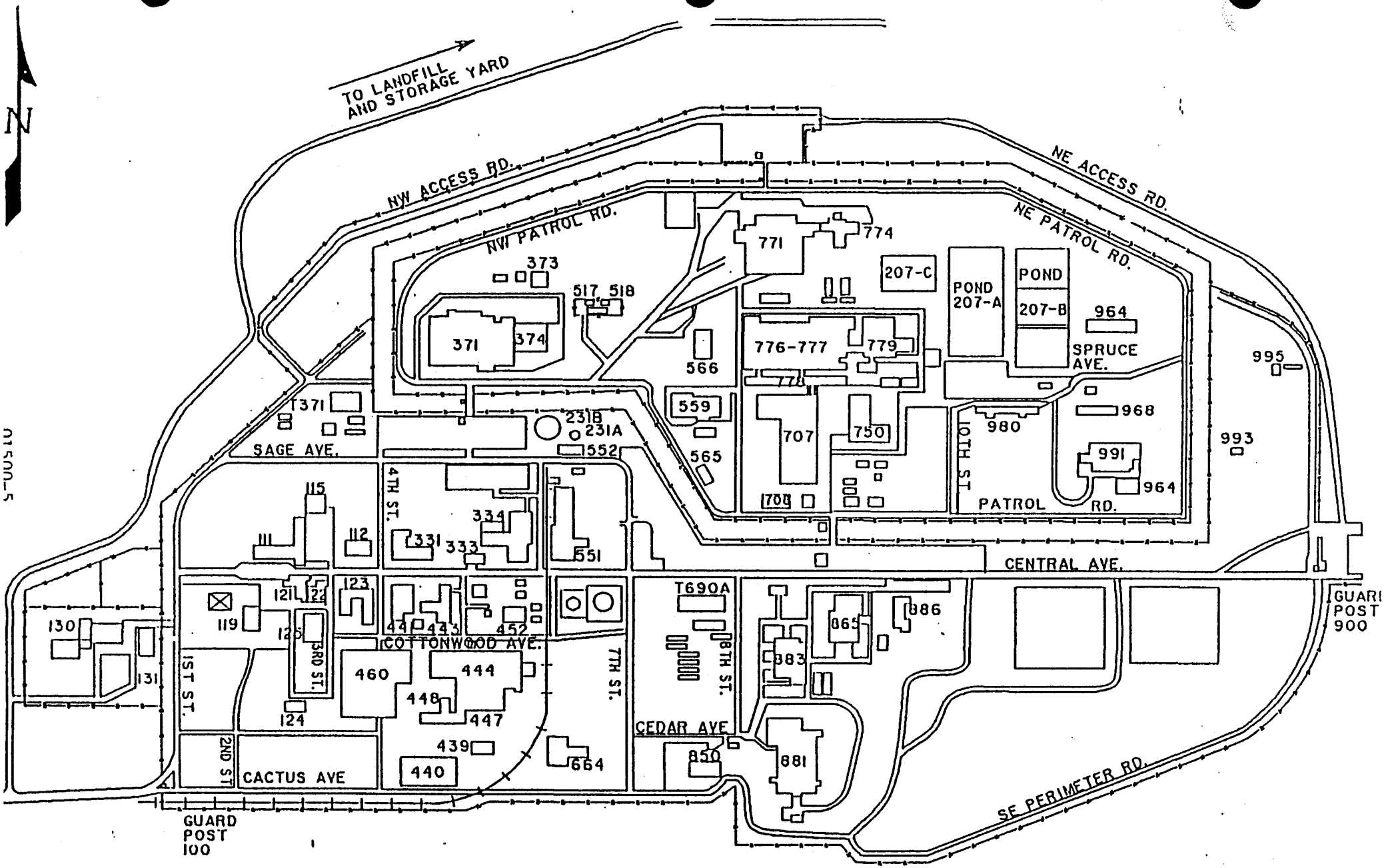
	SIZE	DRAWING NUMBER	ISSUE	SHEET
STANDARD NO. SC 103	A	23854-1	A	1 of 1

RF-46149 (12-71) PLBL-HS

ROCKY FLATS PLANT LOCATION MAP



DATE– 1/28/81	ROCKY FLATS PLANT
	LOCATION MAP
SCALE–GRAPHIC	



ROCKY FLATS AREA PLOT PLAN

R.MISC.BLL.RF.AREAPLOTPLAN 5/89

ROCKY FLATS AREA PLOT PLAN

ROCKY FLATS
CONTRACTOR YARD/TRAILER USE PERMIT

DATE: ___/___/___ (SEE BELOW)

CONTRACTOR:_____ SUPERVISOR:_____

ADDRESS:_____ PHONE:_____

PROJECT:_____ AREA/BLDG:_____

CONTRACT NO.:_____ AUTHORIZATION NO.:_____

CONTRACT PERIOD: (FROM)_____ (TO)_____

TRAILER USED FOR:_____

TYPE OF MATERIAL STORED:_____

FLAMMABLES (?):_____

CONTRACTORS MUST COMPLY WITH ALL RULES PERTAINING TO THE USE OF THE CONTRACTOR'S OFFICE/STORAGE FACILITIES AT ROCKY FLATS. CONSTRUCTION MANAGEMENT PERSONNEL WILL CONDUCT WEEKLY INSPECTIONS OF THE AREA TO INSURE CONTRACTOR COMPLIANCE. VIOLATIONS OF THE RULES CAN RESULT IN EVICTION.

EG&G MAY DISPOSE OF ANY CONTRACTOR EQUIPMENT/MATERIALS REMAINING ON PLANT- SITE MORE THAN TEN DAYS AFTER COMPLETION OF THE CONTRACT.

THIS PERMIT IS VALID FOR THE DURATION OF THE CONTRACT - NOT TO EXCEED ONE YEAR. REISSUANCE OF THE PERMIT IS THE RESPONSIBILITY OF THE CONTRACTOR.

_____ _____
CONTRACTOR REPRESENTATIVE CONSTRUCTION COORDINATOR

_____ _____
FIRE DEPARTMENT CONSTRUCTION MANAGEMENT MANAGER

_____
HS&E

(Permit must be enclosed in a waterproof plastic envelope, and securely attached to the outside entrance to the trailer. A separate permit is required for each trailer.)

1) Forms shall conform to the shape, lines, and dimensions of members as called for on the drawings and shall be substantial, free from surface defects, and sufficiently tight to prevent leakage of concrete.

2) Forms shall be properly braced or tied together to maintain position and shape under load.

3) Joints shall be leakproof and arranged vertically.

4) Lumber previously used in forms shall have nails withdrawn, and surfaces to be exposed to concrete shall be cleaned before reuse.

5) Forms shall be so placed as to be readily removable without hammering or prying against the concrete.

3.2 CORNER FORMS: All vertical and horizontal corners to be exposed when forms are removed shall have a 3/4- X 3/4-in. minimum chamfer unless indicated otherwise on the drawings.

3.3 COATING

A. Apply two coatings of form oil to forms before placing concrete.

B. After application, remove surplus oil from forms, and before placing concrete, remove all oil from reinforcing steel.

3.4 REMOVAL OF FORMS AND FALSE WORK

A. Leave false work and forms in place under structural slabs, beams, and girders for 14 days after the day of the last pour except:

1) When high early strength cement is used, forms for all structures may be removed after 2 days.

2) In cold weather, this length of time shall be determined by the Buyer utilizing test cylinders cured under jobsite conditions.

B. Remove all other forms in not less than 12 hr.

3.5 FILLING HOLES: Holes remaining from bolts or form ties or rods shall be filled solid with cement mortar. All excess mortar at face of filled holes shall be struck-off flush.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART I: GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE:

A. Section 03100: Concrete Formwork

B. Section 03300: Cast-in-Place Concrete

1.2 DELIVERY AND HANDLING:

A. Deliver steel reinforcement in an undamaged condition, and store away from drainage ways and vehicular traffic.

B. Handle reinforcement in a manner that will avoid bending or permanent deforming of the bars.

1.3 SUBMITTALS: Submit the following in advance of fabrication.

A. Shop Drawings: Submit shop drawings for reinforcing steel prepared in accordance with ACI 315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures". Show layouts, bending diagrams, assembly diagrams, dimensioned types and locations of all bar laps and splices, and shapes, dimensions, and details of bar reinforcing and accessories. Include layout plans for bar supports and chairs, with typical details.

PART II: PRODUCTS

2.1 MATERIALS:

A. Reinforcement Bars: Conform to American Society for Testing and Materials (ASTM) A-615, Grade 60.

B. Mesh Reinforcement: Conform to ASTM A-185.

PART III: EXECUTION

3.1 DESIGN: Reinforcing details shown on the Drawings shall govern the furnishing, fabrication, and placing of reinforcement. Construction shall conform to the following requirements:

A. Quantities and placement of reinforcement shall be in accordance with American Concrete Institute Standard 318 and the Manual of Standard Practice of the Concrete Reinforcing Steel Institute.

B. Splices:

1. Splices of bars shall be made only where shown on the plans or as approved by the Buyer. Where bars are spliced they shall be lapped at least 30 bar diameters unless otherwise shown on the Drawings.

2. Splicing shall be accomplished by placing the bars in contact with each other and wiring them together.

3. Welding of reinforcing steel will not be permitted unless specifically authorized by the Buyer.

3.2 PLACING OF REINFORCEMENT:

A. Before placing, thoroughly clean all reinforcement of rust, dirt, mill scale or coatings, and other material which would reduce the bond.

B. Reinforcement appreciably reduced in section shall not be used.

C. Following any substantial delay in the work, previously placed reinforcement left for future bonding shall be inspected and cleaned.

D. Do not bend or straighten reinforcement in a manner that will injure the material.

E. Heating of reinforcement for bending or straightening will not be permitted.

F. Torch cutting of reinforcing steel will not be permitted.

G. Reinforcement shall be accurately placed and securely tied at all intersections and splices with 16-gage black annealed wire and shall be securely held in position during the placing of concrete by spacers, chairs, and approved supports.

END OF SECTION 03200

SECTION 03300

CAST-IN-PLACE CONCRETE

PART I: GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE:

A. Section 03100: Concrete Formwork

B. Section 03200: Concrete Reinforcement

1.2 APPROVALS:

A. Obtain written approval from the Buyer before placing concrete.

B. Obtain approval for each individual pour or structure.

1.3 DESIGN CRITERIA:

A. The design of the concrete mix, that is, the exact proportion of cement, aggregates, additives, and water, shall be the responsibility of the Contractor.

B. The proposed mix shall be submitted for approval 10 working days prior to placing concrete.

1.4 ENVIRONMENTAL REQUIREMENTS:

A. Temperature. Do not place concrete unless the atmospheric temperature in the shade is above 40 degrees F and rising (except as noted below).

B. Weather. Do not place concrete in rainy weather.

C. Cold Weather Concreting:

1. Obtain permission from Buyer before doing any cold weather concreting.

2. Perform concrete work in accordance with American Concrete Institute (ACI) Standard 306 when the mean daily temperature is 40 degrees F or there is a danger of the temperature falling below 32 degrees F.

PART II: PRODUCTS

2.1 MATERIALS:

A. Cement:

1. Portland Cement: Conform to American Society for Testing and Materials (ASTM) C150, Type I or Type II.

2. Air-Entraining Portland Cement: Conform to ASTM C150, Type IA, low alkali.

3. High Early Strength Portland Cement: Conform to ASTM C150, Type III.

B. Aggregate:

1. Aggregate for Regular-Weight Concrete: Conform to ASTM C33.

2. Aggregate for Lightweight Concrete: Conform to ASTM C330.

3. Coarse aggregate shall be 3/4- to 1-1/2-in. maximum size.

C. Water: Clean and potable.

D. Admixtures:

1. Air Entraining: Conform to ASTM C260.

2. Obtain approval for use of admixtures (except air entraining).

E. Expansion Joint Material:

1. For vertical application, use self-expanding cork or sponge rubber conforming to ASTM D1752.

2. For horizontal application, use nonextruding asphalt-impregnated fiber material conforming to ASTM D1751.

F. Curing Materials:

1. Water-Proof Paper: Conform to ASTM C171, Type I or Type II.

2. Polythylene Sheeting: Minimum 4 mils thick, white color.

3. Curing Compound: Conform to ASTM C309, Type 2, having a white-pigmented base.

2.2 PROPORTIONING OF CONCRETE:

A. Concrete shall be proportioned in accordance with ACI Standard 301 to attain the required design strength.

B. Air entrainment shall be used in concrete for all structures that will be exposed to freezing and thawing.

C. The concrete shall have a slump appropriate for the selected work. Slump shall not be less than 1 in. nor greater than 4 in. except as authorized by the Buyer.

D. Concrete shall be designed to develop the minimum compressive strength as shown on the Drawings. When the compressive strength is not indicated on the Drawings, it shall be a minimum of 4,000 PSI at 28 days.

2.3 MIXING OF CONCRETE:

A. Concrete shall be mixed in accordance with ACI Standard 301.

B. Transit-mixed concrete shall be mixed and delivered in accordance with ACI Standard 304.

C. When necessary for proper control of concrete, mixing of transit-mixed concrete shall be done at site of concrete placement.

PART III: EXECUTION

3.1 PREPARATION FOR PLACING CONCRETE:

A. Remove water and mud from excavation.

B. Remove hardened concrete, wood chips, ice, and other debris from the interior of forms.

C. Oil or wet forms just prior to placing concrete.

D. Notify other crafts so they may deliver anchors for other work. Obtain their assistance in setting anchors if required.

E. Moisten absorptive foundations against which concrete will be placed.

3.2 PLACING CONCRETE:

A. Concrete shall be placed in accordance with ACI Standard 301.

B. Concrete shall be placed in forms within 60 min. from the time of introduction of cement and water.

C. Do not retemper concrete.

D. Deposit concrete as close as practicable to its final position. Do not drop concrete more than 5 ft.

E. Place concrete in continuous horizontal layers; the depth of each layer shall not exceed 12 in.

3.3 MECHANICAL AGITATION:

A. Immediately after depositing, compact the concrete by means of mechanical vibrators. Slabs may instead be compacted by means of grid tampers when approved by the Buyer.

B. Vibrator shall be flexible electric type or approved compressed-air type.

C. Do not place vibrator against reinforcing or forms or use vibrator to transport concrete within forms.

3.4 FINISHING CONCRETE:

A. Smooth Finish: Give smooth finish to all exterior concrete surfaces, except slabs, that will be exposed to view.

1. Thoroughly wet and then brush coat surfaces with cement grout (one part Portland cement to two parts fine aggregate mixed with water to consistency of thick paint).

2. Spread grout with sponge or wood float to fill all pits and surface irregularities.

3. Scrape off excess grout and rub surface with burlap to remove visible grout film.

4. In hot weather, keep grout damp by means of fog spray during the setting period.

B. Rubbed Finish: Give rubbed finish to interior concrete surfaces, except slabs, that will be exposed to view.

1. Give smooth finish as specified above, then rub with carborundum stones and water.

2. Do not use mortar or grout during rubbing.

3. Remove excess mortar that is worked up during rubbing.

C. Monolithic Slab Finish: Give monolithic finish to interior floor slabs.

1. Compact fresh concrete and screened to required elevation.

2. Float to a true, even plane with no coarse aggregate visible.

3. After surface moisture has disappeared, steel trowel floor slab to a smooth, even finish, free from trowel marks.

D. Broomed Finish: Give broomed finish to all trading surfaces of docks, walks, and steps exterior to the building.

1. Give monolithic finish as specified above, except immediately after steel troweling brush surface with a stiff bristle brush.

2. Brush in parallel strokes at right angles to the normal flow of traffic.

E. Slab Flatness Tolerances: Finished cast-in-place slabs shall not vary more than 1/8 in. from a 10-ft. straightedge.

3.5 CURING

Protect concrete against loss of moisture for at least 7 days by using one of the following methods for the surfaces indicated:

A. Vertical Surfaces and Under Surfaces of Beams and Elevated Slabs:

1. Moist cure with forms in place for the full curing period, or

2. Cover with wet burlap, or

3. Fog spray.

B. Slabs Ongrade and Floor Slabs:

1. Cover with water-proof curing paper or polyethylene sheet, lapped 4 in. at joints and sealed with tape or

2. Cover with burlap or cotton mats and keep such covering continuously wet.

C. Exterior Walks, Docks, and Stairs:

1. Apply curing compound in a two-coat continuous operation using a minimum of 1 gal. per 200 ft^2 for each coat. Apply second coat at right angles to direction of first coat or

2. use method indicated in paragraph A above.

3. Do not use curing compound on concrete surface to which future concrete will be bonded.

3.6 PATCHING:

A. Immediately after removal of forms, remove all fins and loose material.

B. Chip out to solid concrete all honeycomb, aggregate pockets, and voids over 3/4 in. in diameter.

C. Fill chipped holes with epoxy mortar or neat cement grout. Finish holes flush to adjacent surfaces.

D. Damp cure patchwork for 72 hr.

3.7 FIELD QUALITY CONTROL:

A. Sample-Taking:

1. Preparation of concrete samples and testing of such samples shall be the responsibility of the Buyer.

2. The Contractor shall provide assistance in obtaining concrete samples.

3. The Buyer may take three test cylinders from each placement of 50 yd^3 or fraction thereof.

B. Compression Tests:

1. Test cylinders shall be made in accordance with ASTM C31 and tested in accordance with ASTM C39.

2. One cylinder will be tested at 7 days, one at 28 days, and one retained as a spare.

C. Slump Tests: Slump of concrete shall be determined at point of discharge from the mixer in accordance with ASTM C143.

END OF SECTION 03300

SECTION 03600

GROUT

PART I: GENERAL

1.1 DELIVERY AND STORAGE

Store all grouting materials in undamaged condition with seals and labels intact as packaged by the manufacturer.

PART II: PRODUCTS

2.1 GROUT

A. Composition shall be one part Portland cement and three parts sand.

B. Add water to create a stiff mixture.

C. Minimum compressive strength shall be 1,500 PSI at 28 days.

D. Discard grout not placed after 1 1/2 hr.

PART III: EXECUTION

3.1 GROUTING

A. Pack grout tightly around well casings, pipe or conduit in penetrations through masonry or concrete walls.

B. Smooth exposed surfaces of grout to blend with adjacent surfaces.

END OF SECTION 03600

SECTION 03601

NONSHRINK GROUT

PART I: GENERAL

1.1 DELIVERY AND STORAGE: Store all nonshrink grouting materials in undamaged condition with seals and labels intact as packaged by the manufacturer.

PART II: PRODUCTS

2.1 MATERIALS:

A. Nonshrink grout for setting column bases, anchor bolts, equipment, and other items shown on the Drawings shall be one of the following types:

1. EMBECO (premix): As manufactured by Master Builders Company.

2. Ceilcote 648: As manufactured by The Ceilcote Company, Inc.

B. Adhesive for Ceilcote Grout: Ceilcote 348 Adhesive Fast Set as manufactured by The Ceilcote Company, Inc.

C. Portland Cement: Conform to American Society for Testing Materials (ASTM) C150, Type I.

D. Sand: Conform to ASTM C33, Fine Aggregate.

E. Pea Gravel: Conform to ASTM C33, Coarse Aggregate, graded so that at least 90% passes 3/8-in. sieve and 90% is retained by a No. 4 sieve.

2.2 MIXES:

A. EMBECO Grout:

1. For less than 2-in. clearances or where size or shape of space makes grouting difficult, use standard EMBECO grout and water.

2. For greater than 2-in. clearances where coarse aggregate will not obstruct free passage of the grout, use EMBECO grout with 3/8-in. aggregate (premixed).

3. Use the minimum amount of water necessary to produce a flowable grout without causing either segregation or bleeding. After the grout has been mixed, do not add more water for any reason.

B. Ceilcote Grout: Mix according to manufacturer's instructions.

C. Portland Cement Mortar for Raked-Out Edges of EMBECO Grout: one part Portland cement, two parts sand, and 0.50 parts water by weight.

PART III: EXECUTION

3.1 FORMWORK:

A. Build leakproof forms that are strong and able to withstand grout pressures.

B. Provide enough clearance between the formwork and the area to be grouted to permit proper placement of grout.

3.2 SURFACE PREPARATION:

A. Clean concrete surfaces to be grouted of all defective concrete, dirt, oil, grease, and other foreign matter.

B. Lightly roughen the concrete.

C. Remove grease and foreign materials from all steel surfaces in contact with grout.

D. Align, level, and maintain final positioning of all components to be grouted.

E. Saturate all concrete surfaces with clean water, remove excess water, and leave none standing.

3.3 PLACING:

A. Place nonshrink grouting quickly and continuously by the most practical means permissible: pouring, pumping, or under gravity pressure. Do not use either pneumatic-pressure or dry-packing methods without written permission from the Buyer.

B. Where practical, apply grout from one side only to avoid entrapping air.

C. Do not vibrate the placed grout mixture or allow it to be placed if the area is being vibrated by nearby equipment.

D. Do not remove leveling shims for at least 48 hr. after grout has been placed.

E. After the EMBECO grout has reached initial set, rake out all exposed edges approximately 1/2 in. into the grouted area and point with cement-sand mortar or grout.

3.4 CURING: Cure grout for 3 days after placing by keeping wet and covering with curing paper or by another approved method.

END OF SECTION

SECTION 09900

PAINTING

PART I: GENERAL

1.1 QUALITY ASSURANCE:

A. Include on label of containers:

- Manufacturer's name
- Type of paint
- Manufacturer's stock number
- Color
- Instructions for application
- Paint analysis

B. Field Quality Control:

1. Request review of first finished, space, or item of each color scheme required by Buyer for color, texture, and workmanship.

2. When required by Buyer, paint surface not smaller than 50 ft^2 as project standard for selected types of paint.

1.2 SUBMITTALS:

A. Furnish test samples of materials when required by the Buyer.

B. Color Samples:

1. Submit color samples or charts from which final colors shall be selected by the Buyer.

2. Colors indicated in the paint schedule shall be matched as closely as possible.

C. Submit proposed paint and color schedule for approval, including for each item:

- Surface to be painted
- Type of paint
- Special thinners required, if any
- Color
- Special surface preparation required

1.4 PRODUCTS DELIVERY AND STORAGE:

A. Delivery of Materials: Except for locally mixed custom colors, deliver materials in sealed containers with labels intact and legible.

B. Storage of Materials:

1. Paint materials and related equipment shall be stored outside in the area assigned by the Buyer.

2. The Contractor shall provide storage facilities adequate to protect the paint materials and equipment from inclement weather. The storage facilities shall have adequate ventilation. During cold weather, the storage facilities shall be heated to not less than the minimum recommended by the paint products manufacturer and at no time shall the temperature be below 35 degrees F.

3. At the end of each work day, all paint materials shall be removed from the work area and properly stored.

4. The Contractor shall obtain approval from the Buyer for all paint storage facilities used at the jobsite. All storage facilities used on the jobsite will be subject to inspection at any time by the Buyer's fire inspector.

1.5 JOB CONDITIONS:

A. Environmental Conditions:

1. Comply with manufacturer's recommendations for environmental conditions under which coatings and coating systems can be applied.

2. Do not apply finish in areas where dust is being generated.

3. Provide adequate ventilation when using flammable or toxic paint materials.

B. Protection:

1. Cover or otherwise protect surfaces not being painted.

2. Furnish fire-retardant protective coverings. Do not use flammable material for protective coverings unless special permission is obtained from the Buyer.

PART II: PRODUCTS

2.1 MATERIALS:

A. Materials selected for painting systems for each type of surface shall be the products of a single manufacturer.

B. Other products not specified, but required for the job, shall be "first-line" products designed for the intended use.

2.2 COLORS: Colors of paints shall match color chips selected by the Buyer.

2.3 MIXING AND TINTING:

A. Deliver paints ready mixed to jobsite.

B. Accomplish job mixing and job tinting only when acceptable to the Buyer.

C. Using tinting colors recommended by manufacturer for the specific type of finish.

PART III: EXECUTION

3.1 INSPECTION:

A. Examine surfaces scheduled to receive paint for conditions that will adversely affect execution, permanence, or quality of work and which cannot be put into an acceptable condition through preparatory work.

B. Do not proceed with surface preparation or coating application until conditions are suitable and approved by the Buyer.

3.2 PREPARATION OF SURFACES

A. All interior surfaces including the outside of the inner tank surface preparation: SSPC-SP10 Near White Blast.

B. All exterior surfaces of the outer tank including the roof surface preparation: SSPC-SP6 Commercial Blast.

3.3 APPLICATION:

A. Apply paint with suitable brushes, rollers, or spraying equipment.

1. Do not exceed rate of application recommended by paint manufacturer for type of surface involved.

2. Keep brushes, rollers, and spraying equipment clean, dry, and free from contaminants.

B. Comply with recommendation of product manufacturer for drying time between succeeding coats.

C. Vary slightly the color of successive coats. Tinting shall be uniform.

D. Sand and dust between each coat to remove defects visible from a distance of 5 ft.

E. Finish coats shall be smooth, free of brush marks, streaks, laps or pileup of paints, and skipped or missed areas.

1. Finished metal surfaces shall be free of skips, voids, or pinholes in any coat when tested with a low-voltage detector.

F. Inspection:

1. Do not apply successive coats until each completed coat has been inspected and approved by the Buyer.

2. Only inspected coats of paint will be considered in determining the number of coats applied.

3. Defective or improper previous coatings shall be removed or corrected to the satisfaction of the Buyer.

G. Make edges of paint adjoining other materials or colors clean and sharp with no overlapping.

3.4 CLEANING:

A. Touch up and restore finish where damaged.

B. Remove spilled, splashed, or splattered paint from all surfaces.

C. Do not mar surface finish of item being cleaned.

3.5 PAINTING SYSTEMS AND SCHEDULES:

A. Painting Systems:

1. Paint System One (PS-One) for all interior surfaces of effluent storage tanks including the outside of the inner tank, the inside surface of the roof, and wire mesh.

a. Prime Coat - Tnemec Series 104 H.S. Epoxy, 6.0-8.0 Dry Film Mils (DFM).

b. Finish Coat - Tnemec Series 104 H.S. Epoxy, 6.0-8.0 DFM.

c. Total Both Coats - 12.0-16.0 DFM.

2. Paint System Two (PS-Two) for all exterior surfaces of the outer tank of effluent storage tanks including the roof and wire mesh.

a. Prime Coat - Tnemec Series 66 Hi-Build Epoxoline, 4.0-6.0 DFM.

b. Finish Coat - Tnemec Series 73 Endura-Shield III, 3.0-5.0 DFM.

c. Total Both Coats - 7.0-11.0 DFM.

B. Paint Schedules (all colors will be selected by the Buyer when not specified in the following schedules).

1. Effluent Storage Tanks, interior surfaces: PS-One.

2. Effluent Storage Tanks, exterior of exterior tank: PS-Two.

END OF SECTION

SECTION 13208

WELDED STEEL EFFLUENT STORAGE TANKS AND FOUNDATIONS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

Furnish all labor and materials necessary to design and install three 159,000 gallon welded steel effluent storage tanks and containment rings, inlet, outlet, drain lines, access manholes, ladders, access covers, vents, nozzles, screens, foundations, and all other items shown on the Drawings, required herein, and necessary to provide a complete operational facility.

A. Work Included in This Section

1. Welded steel effluent water storage tank and appurtenances, design and construction.

2. Storage tank testing.

3. Foundations for effluent tanks, design and construction.

B. Related Work in Other Sections

1. Painting, Section 09900.

C. Capacity. Each of the two welded effluent steel tanks shall have two concentric steel rings and have control dimensions as follows:

Volume	159,000 gallons
Approximate Low Water	Elev. 5993.8
Outer Tank Bottom (at wall)	Elev. 5992.8
Overflow	Elev. 6009.5
Inside Diameter Storage Tank	41.5 ft.
Inside Diameter Outer Tank	48.5 ft.

D. Description. Each of the effluent tanks shall consist of two concentric steel tanks, an inner tank for effluent storage, and an outer tank for secondary containment. Each of the inner tanks will have a diameter of 41.5 feet and a shell height of 16 feet. The outer tanks will have a diameter of 48.5 feet and a shell height of approximately 16 feet. The inner and outer tanks each have a separate floor and a common roof. The floor of the inner tank will sit on structural I-beams directly on the floor of the outer tank. The common roof will extend from the center of the inner tank over the outer tank wall, with a 1 foot minimum overhang. The common roof will be separated from the tank walls by the roof structural beams such that a ventilation space occurs between the roof and tank walls.

1.2 APPLICABLE STANDARDS

All work in the fabrication shop and in the field for both inner and outer tanks shall conform with all applicable requirements of the following, except as hereinafter modified or specified: American Water Works Association (AWWA) Specification D-100, as latest revised, Standard Specifications for Welded Steel Tanks, Standpipes, and Reservoirs for Water Storage.

1.3 QUALITY

The steel tank and appurtenances shall be new and of a current manufacture.

1.4 SOIL INVESTIGATION

The Subsurface Investigation and Engineering Analysis Report is included in the Appendix.

1.5 TANK FOUNDATIONS

Tanks foundations shall be designed by the Contractor with the foundation as shown on the drawings as the minimum acceptable structural design. Foundation design of higher structural strength (such as one containing a ring wall) will be acceptable at the Contractor's discretion, subject to Buyer approval. The Contractor will submit drawings and calculations to the Buyer for approval. The performance of the tank/foundation system is the responsibility of the Contractor.

1.6 QUALIFICATIONS

The Contractor shall demonstrate that a firm which is regularly engaged in the design of industrial facilities has been retained for both the tank and foundation designs. Both the tank design and foundation design shall be certified and sealed by a Professional Engineer registered in the State of Colorado. Qualifications of firms shall be submitted with the Contractor's bid.

1.7 SUBMITTALS

Contractor submittals shall be in accordance with Division 1. Calculations for the tank design and foundation design will be required with the Contractor's submittals, for Buyer approval. Mylar drafting media and drawing numbers will be supplied to the Contractor for the purpose of generation of design and construction drawings prior to construction.

1.8 GENERAL TANK DESIGN REQUIREMENTS

A. The vessels shall be designed and fabricated according to AWWA Standard D-100, latest revision.

B. The tanks and foundations shall be designed per the design conditions and external loadings stated in Section 13208, Part II. All loading conditions shall be examined including loads induced into the vessel shells or roof. The tanks shall be designed to maintain structural integrity during and after a seismic event. Tanks shall be qualified for seismic load by analysis.

C. The Contractor shall design and furnish the roof structural support beams and grillage beams beneath the inner tanks. The purpose of the grillage beams beneath the inner tanks is to provide space for visual inspection of the outer tank floor beneath the inner tanks for leaks. The general arrangement and structural design of the grillage beams are the responsibility of the Contractor. The grillage beam design and construction shall be such that the beams are structurally and functionally compatible with the tank foundation. The grillage beams shall be designed such that they directly support the shell wall of the inner tank. The beams shall be discontinuous to allow for the tank bottom slope and desired drainage.

1.9 GENERAL TANK FABRICATION REQUIREMENTS

A. All tank fabrication and materials shall comply with AWWA Standard D-100, latest revision.

B. Fabrication tolerances for tanks shall be as specified in AWWA Standard D-100, latest revision.

C. Flanged nozzles shall be 150 pound flat face conforming to ANSI B16.5. Nozzle projections from outside diameter of shell to extreme face of flange shall be 1 foot.

D. Except as otherwise noted, orientation of bolt holes for flanged nozzles shall straddle vertical and horizontal centerlines.

E. External attachments shall be of the same material as the shell and heads to which they are directly attached.

F. Longitudinal and circumferential seams shall be located to clear openings and their reinforcing pads. When covering of a circumferential seam is unavoidable, the seam shall be ground flush and inspected prior to welding the pad in place.

G. Any repairs required to bring the vessel into compliance with these specifications will be done at the Contractor's expense.

H. A steel nameplate shall be seal-welded to the tank at a location two feet on either side of the shell manway. No exceptions will be allowed for the seal welding requirement on the nameplate. The following information for the inner tank

shall also be stamped in 3/16-inch-high letters on the nameplate:

1. Capacity in gallons.

2. Shell, bottom and roof material and thickness in inches.

3. Rocky Flats purchase order number.

4. Rocky Flats specification number.

5. Rocky Flats equipment name and item number (furnished by the Buyer).

6. Corrosion allowance.

PART II: PRODUCTS

2.1 STEEL TANK

A. General. The tank shall be all welded steel construction. It is the intent of this Specification that the tank be fabricated with a minimum amount of interior steel surface area so as to ease the problem of maintenance painting. To this end, the roof support system shall be designed with the minimum number of columns, girders, and rafters practicable. Standard structural shapes shall be used throughout, and no built-up members with intricate lattice work will be permitted. Roof and support system shall be designed so that there are no blind or inaccessible paint areas.

B. Materials and Design. Materials, piping, and valves shall conform to the requirements of pertinent sections of these specifications and Section 2 of AWWA D-100 and designed with the requirements of Section 3 and 4 of AWWA D-100. The minimum thickness of any plates in contact with water shall be 1/4 inch. The minimum thickness for roof plates shall be 3/16 inch. The manufacturer may use Appendix C of AWWA D-100 in the design.

1. Copies of the supporting design calculations shall be submitted to the Buyer for approval.

2. The tanks have been categorized as Important - Low Hazard Classification for Seismic Qualification, according to RFP Standard SC-106. The tanks shall be designed for a lateral seismic force of 0.13 g in accordance with AWWA D-100 procedures, or according to RFP Standard SC-106, whichever is more stringent.

3. Wind load design shall be based on a velocity of 109 mph, exposure C, from any direction. Wind pressures on exposed surfaces shall be determined in accordance with ANSI A58.1.

4. Snow load design shall be in accordance with ANSI A58.1, 43 psf ground load.

C. Column Foundation Design. All roof support columns shall be tubular hermetically sealed with adequate provision to distribute load at the bottom plate of the inner tank to prevent buckling. Allowable soil bearing value under the tanks is 2500 pounds per square foot for dead loads, 3500 pounds per square foot for combined dead and live loads and 4700 pounds per square foot for all loads including wind or seismic. See soil report in Appendix.

D. Welded Steel Roof. The roof shall be conical with near flat surface joining the roof plates. Rafters and supporting beams shall be provided with positive lateral support, either continuous or intermittent, at the compression flange. Structural steel framing shall be in accordance with AISC Manual of Steel Construction, 9th Edition, 1989.

E. Tank Accessories. Except as stipulated herein, tank accessories shall be of the kind and construction as specified in Section 5 of AWWA D-100, as latest revised, and shall have the following accessories as shown on the drawings:

1. 30 in. diameter shell access manhole (4).

2. Inside ladders with safety device which meets OSHA Standards (2).

3. Outside ladder with cage and safety device which meets OSHA Standards.

4. Nozzles for corrosion protection and instrumentation.

5. Inlet pipe.

6. Outlet pipe.

7. Overflow weir box and overflow drain.

8. 30 in. roof access manhole (hinged and hasped) with non-slip surface adjacent to the roof hatch (2).

PART III: EXECUTION

3.1 FOUNDATION

The foundation for the steel tank shall consist of a prepared base under the steel plate floor. The foundation shown on the drawings is the minimum design acceptable. The final foundation design shall be compatible with the design of the tank and soils, and is the full responsibility of the Contractor.

3.2 FABRICATION AND ERECTION

Accessories shall be fabricated as completely as possible in the shop and delivered to the job as a unit ready for the installation. Edges shall be straight. Joints shall be closely made with metal against metal and shall be as invisible as possible.

A. Prior to commencing painting or coating work, a pre-job conference shall be held for the purpose of reviewing and clarifying the painting and coating requirements of the project. The Buyer, Contractor, Applicator, Coatings and Paint Manufacturers, and the Inspector shall be present. A schedule for work to be accomplished will be established.

B. Tank interior surfaces of roof plates, roof rafters, and supports, and all contact surfaces inaccessible after assembly, shall be coated before erection; however, no structural friction connections or high tensile bolts and nuts shall be painted before erection. Areas damaged during erection shall be hand or power-tool cleaned and recoated with prime coat.

C. Warranty inspection shall be conducted during the eleventh month following completion of all painting and coating work. All personnel present at the Pre-job Conference, shall attend this inspection. All defective work shall be repaired in accordance with requirements of Painting Specifications to the satisfaction of the Buyer or his appointed representative.

3.3 INSPECTION AND TESTING

A. Nondestructive Examination Requirements:

1. Nondestructive examination (NDE) methods shall be performed on the tanks per AWWA Standard D-100, Section 11, latest revision and addenda.

2. After the tanks have been erected, but prior to painting, selected weld areas shall be spot radiographed per AWWA Standard D-100, Section 11, latest addition and addenda. The expense of the X-ray and repair of faulty welds shall be borne by the Contractor. The Buyer shall not be limited as to the location and the number of tests required by AWWA Specifications.

3. All non-fluid containment welds shall be visually inspected with obvious defects such as undercutting, cracks, nonfusion, etc., rejected as unacceptable until repaired or replaced.

4. Leakage Test.

Upon completion of both the inner and outer tanks, prior to painting, both tanks shall be filled with potable water to the overflow level. Testing shall be in conformance with Section 11 AWWA Standard D-100 (latest edition). The duration of the test shall be 24 hours and show no leaks. All welded joints in the bottom of the tank shall be vacuum tested with a vacuum box and soap solution.

B. Inspection.

1. The Buyer reserves the right to inspect any work performed at any time during construction.

2. The Buyer reserves the right to waive any of the inspection requirements in this Specification.

3. The Buyer shall be provided the opportunity to witness all NDE and the leak test. The Buyer will also perform a final inspection.

4. The Contractor shall notify the Buyer at least seven (7) working days prior to a required inspection of the vessel.

5. The Contractor shall furnish all equipment, services, and utilities necessary for proper testing and inspection of the vessel.

6. Final acceptance shall be contingent upon satisfactory inspection by the Buyer and after receipt and approval of all documentation required by this Specification and the purchase order.

3.4 PREPARATION FOR USE

A. The vessel surfaces shall be prepared and painted as specified under Section 09900, Painting.

B. After painting is completed, the tanks shall be swept and mopped clean of all debris, and flushed out thoroughly. The tanks shall be washed clean of all sand and dust, and the wash water shall be flushed from the tanks.

C. All openings shall be covered or plugged to prevent dust, dirt, or other foreign material from entering the vessel.

3.5 TANK GROUNDING, ELECTRICAL, AND CORROSION PROTECTION SYSTEM

Tank grounding and electrical will be provided by others during Phase IIA construction of the project. In addition, an impressed current corrosion protection system will be provided by others as part of Phase IIA.

END OF SECTION 13208

APPENDIX

APPENDIX

SUBSURFACE INVESTIGATION AND ENGINEERING ANALYSIS REPORT
PROPOSED GROUNDWATER TREATMENT PLANT
ROCKY FLATS PLANT

PREPARED FOR:

ENGINEERING-SCIENCE, INC.
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DENVER, COLORADO 80204

PREPARED BY:

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TABLE OF CONTENTS

CONCLUSIONS	PAGE	1
SCOPE OF STUDY	PAGE	3
FIELD INVESTIGATION	PAGE	5
SITE CONDITIONS	PAGE	7
SUBSURFACE CONDITIONS	PAGE	9
LABORATORY TESTING	PAGE	12
PROPOSED DEVELOPMENT	PAGE	14
BUILDING FOUNDATION RECOMMENDATIONS	PAGE	15
FLOOR SLAB CONSTRUCTION RECOMMENDATIONS	PAGE	21
LATERAL EARTH PRESSURES	PAGE	25
STRUCTURAL FILL MATERIALS/COMPACTION REQUIREMENTS	PAGE	27
SUBSURFACE DRAINAGE SYSTEM	PAGE	33
DRAINAGE CONSTRUCTION DETAILS	PAGE	33
CHEMICAL TESTS	PAGE	33
MISCELLANEOUS	PAGE	33
SITE LOCATION PLAN	PLATE	1 THROUGH 2
PLOT PLAN AND BORING LOCATION PLAN	PLATES	2 AND 2A
LOG OF BORINGS	PLATE	3
LEGEND AND NOTES	PLATES	4A AND 4B
SWELL/CONSOLIDATION TESTS	PLATES	6 THROUGH 10
CONCEPTUAL SUBSURFACE DRAINAGE SYSTEM	PLATE	9
SUMMARY OF LABORATORY TEST RESULTS	TABLE	1
SOIL CHEMISTRY TEST RESULTS	TABLE	2

1.0 CONCLUSIONS

The subsurface conditions encountered at the site are relatively variable. Our exploratory borings encountered TOPSOIL, FILL MATERIAL, and NATURAL SOILS, overlying WEATHERED BEDROCK. The depth to the top of WEATHERED BEDROCK, where encountered, varied from 16 (sixteen) to 19 (nineteen) feet, below the existing ground surface.

Groundwater was not encountered in any of our borings at terminal depths of 12 (twelve) to 30 (thirty) feet below the existing ground surface during drilling operations (September 26, 1989).

All borings were filled with grout immediately after drilling operations. Consequently, no further groundwater readings were possible.

It is our opinion that the proposed Groundwater Treatment Plant structures may be supported on a spread-footing foundation system bearing on the natural clayey SAND and GRAVEL at this site. Design and construction recommendations for the spread-footing foundation system are included in Section 8.0 of this report.

Additional design and construction criteria, including floor slab design and surface and subsurface drainage recommendations, are also presented in various sections within the text of this report.

2.0 SCOPE OF STUDY

This report presents the results of our Subsurface Investigation and Engineering Analysis at the site of the proposed Groundwater Treatment Plant to be located at the Rocky Flats Nuclear Weapons Plant, Jefferson County, Colorado.

The scope of this study was to cover the following subjects:

A) Drill approximately 6 (six) borings at the proposed site.

B) Briefly describe the subsurface conditions encountered.

C) Test soil samples recovered.

D) Recommend the most suitable type of foundations and floor slabs for the proposed structures.

E) Evaluate general groundwater conditions, soil construction sequences and procedures.

F) Provide additional recommendations based on the results of our analysis.

The field investigation consisted of drilling 6 (six) exploratory borings, in order to obtain disturbed and relatively undisturbed samples for laboratory testing. The samples recovered were visually inspected and selected samples were subjected to various laboratory tests to evaluate their physical and mechanical properties.

The soil parameters which we defined, in conjunction with the results of observations made on the site, and our past experience with similar soils under similar loading conditions, were analyzed in order to reach the "Conclusions" presented in this report.

3.0 FIELD INVESTIGATION

The field investigation consisted of drilling 6 (six) exploratory borings at the locations shown in Plate 2. The borings were drilled on September 26, 1989, with a truck-mounted drilling rig.

The drilling rig was equipped with 4.00 (four)-inch, outside diameter (O.D.), solid-stem, continuous flight power augers. The augers were used to clean the holes to the depths at which a soil sample and a Penetration Test (PT), or Standard Penetration Test (SPT), was desired. The augers were then removed, and a 2 (two) inch inside diameter (I.D.) California Spoon Sampler or a 2 (two) inch (O.D.) Standard Split Spoon Sampler was inserted and driven with blows of a standard hammer weighing 140 (one hundred forty) pounds and falling a distance of 30 (thirty) inches.

The Sampler was first seated into the bottom of the hole, and then driven an additional 12 (twelve) inches. The number of blows required to drive the sampler the last foot, or a fraction thereof, constitutes the PT or SPT as described in ASTM Designation D 1586-67 (Reapproved 1974). The PT or SPT results, when properly evaluated, are an index to the strength and density of the material tested. The PT and SPT results are shown on the Log of Exploratory Borings (see Plate 3).

The borings were physically located in the field by the Aguirre Engineers, Inc. Project Engineer using proposed building survey stakes as a reference. Estimated boring elevations were obtained from the "Phase I Construction Site and Grading Plan" provided by Engineering Science, dated August, 1989.

The boring locations and elevations are adequate for the purpose of this report, but should be considered as approximate for any other use.

4.0 SITE CONDITIONS

The project site is located in the southwest quarter of Section 11, Township 2 south, Range 70 west, of the Sixth Principal Meridian, Jefferson County, Colorado.

The project area is bounded on the west by the Building 881 perimeter fence and on the north, by a construction storage area. Undeveloped land lies to the east and south.

Topographic relief in the immediate project area is nearly flat with slight drainage to the east and south. The entire site lies between elevation 5,992 (five thousand nine hundred ninety two) and 5,995 (five thousand nine hundred ninety five) feet MSL. These elevations were obtained from the "Site and Grading Plan" provided to us by Engineering-Science, which was prepared for initial planning purposes.

Vegetation on the site consists of sparse native grasses and weeds.

There were no known existing utilities in the immediate project area. Possible utility locations should be checked prior to the start of construction.

5.0 SUBSURFACE CONDITIONS

The subsurface conditions encountered at this site are relatively variable. Beneath a layer of TOP-SOIL, our borings encountered FILL MATERIAL, NATURAL SOILS and WEATHERED BEDROCK to the boring terminal depths of 12 (twelve) to 30 (thirty) feet below the existing ground surface. The detailed subsurface conditions encountered by our exploratory borings are graphically illustrated on the Log of Borings (see Plate 3). The Legend and Notes necessary to interpret these Boring Logs are contained on Plate 4.

The subsurface materials and groundwater conditions encountered are described in the following subsections:

5.1 TOPSOIL: was encountered in all of our borings at the ground surface. The thickness of the TOPSOIL was approximately 0.25 foot.

TOPSOIL is not suitable for support of structural loads or pavement sections. TOPSOIL should be removed from all buildings, driveways and parking areas. TOPSOIL can be stock-piled for future use in revegetation, or wasted off the project site.

5.2 FILL MATERIAL: was encountered in all of our borings underlying the TOPSOIL and over-lying the NATURAL SOILS. The FILL MATERIAL consisted of clayey SAND, GRAVEL and COBBLES approximately 1.75 feet in thickness.

This FILL MATERIAL is not suitable for support of structural loads or pavement sections. FILL MATERIAL should be removed from all building and paved driveways areas and wasted off the project site.

5.3 NATURAL SOILS: were encountered in all of our borings underlying the FILL MATERIAL

and overlying the WEATHERED BEDROCK. The NATURAL SOILS consisted of clayey SAND and GRAVEL which contained a trace to some silt, was moist to very moist, medium dense to very dense, and light brown to red brown in color. According to the USCS, this SAND and GRAVEL classified as SC-GC material

5.4 WEATHERED BEDROCK: consisting of SEVERELY WEATHERED and WEATHERED CLAYSTONE BEDROCK was found underlying the NATURAL SOILS in Borings 1 through 5. The depth to the top of the SEVERELY WEATHERED CLAYSTONE BEDROCK varied from approximately 8.5 to 14 (fourteen) feet where encountered. WEATHERED BEDROCK was not encountered in Boring 6, because auger refusal occurred in the SAND and GRAVEL layer at 12 (twelve) feet.

The SEVERELY WEATHERED CLAYSTONE BEDROCK, which was encountered in Borings 1 through 5, was weathered to the point of being CLAY and was moist, very stiff to hard, and light gray to gray in color. According to the USCS, this CLAY (severely weathered claystone bedrock) classified as CL material.

The WEATHERED CLAYSTONE BEDROCK, which was encountered in Borings 1 through 5, was dry to moist, hard and gray to dark gray, brown in color.

5.5 GROUNDWATER: was not encountered in any of our borings at depths of from 12 (twelve) to 30 (thirty) feet below the existing ground surface during drilling operations (September 26, 1989).

All borings were backfilled with grout immediately following drilling operations. No subsequent groundwater readings were possible.

Variations in the groundwater condition may be experienced throughout the year, depending upon prevailing climatic conditions and artificial introduction of surface water. The magnitude of variation will be largely dependent upon the duration and intensity of precipitation, irrigation practices and alteration of the surface characteristics in the surrounding area.

6.0 LABORATORY TESTING

All soil samples recovered were visually inspected and classified in the laboratory by the Project Geotechnical Engineer. Selected samples were subjected to a laboratory testing program, which consisted of the following tests: Swell/Consolidation, Gradation Analyses, Percent Fines, Natural Dry Density, Natural Moisture Content, Atterberg Limits, Water Soluble Sulfates and pH.

Swell/Consolidation Tests (see Plates 5 through 7) were performed in order to determine the swell potential of the various subsurface materials upon inundation in water.

Gradation Analyses Tests (see Plates 8 and 9) and Percent Fines Tests (see Table 1) were performed to determine the grain-size characteristics of the soil. Grain-size characteristics can be used to classify the materials according to the various classification systems. Grain-size characteristics may also be useful for interpreting load carrying capacity and the swell potential of the material tested.

Natural Dry Density and Natural Moisture Content Tests (see Table 1) were performed to determine the density and moisture content of the materials encountered. These results may also be used to evaluate compaction characteristics, and to correlate swell potential with other tests.

Atterberg Limits Tests (see Table 1) were performed to determine the water contents which define the various stages of soil consistency. These are the Liquid Limit (LL) where the soil behaves as a viscous liquid, and the Plastic Limit (PL) where the soil begins to break apart and crumble and is no longer plastic. The difference between the LL and PL, defined as the Plasticity Index (PI), represents the range in water contents through which the soil is in the plastic state. These properties are useful in classifying the soils according to the various Soil Classification Systems.

Water Soluble Sulfate Tests (see Table 1) were performed to determined the soluble sulfate content of the soil. The sulfate content of the soil is a determining factor in choosing the appropriate ce-

ment type to be used in concrete exposed to the soil at the project site.

pH Tests (see Table 1), were performed to determine the acidity or alkalinity of the soil, which may be useful in interpreting the corrosion potential of the soils at the site.

7.0 PROPOSED STRUCTURES

We understand that the Groundwater Treatment Plant at the Rocky Flats Nuclear Weapons Plant will be located east of Building 881. The Groundwater Treatment Plant will consist of a 3,000 (three thousand) square foot building (Building 891), an Influent Tank Pad located just south of the main treatment building and ~~2~~ 3 three (~~two~~) Effluent Tanks located west of the Main Treatment Building.

The Treatment Plant building will be constructed with a steel frame and metal walls. The steel frame will be supported on a series of spread footings.

The Treatment Plant building floor will be a concrete slab-on-grade at or near the existing ground surface. The maximum roof elevations will be 23 (twenty-three) feet above the floor. Because the facility will contain hazardous materials, the floor slab will be designed with a 6 (six)-inch high curb along the perimeter and a water stop between the curb and foundation walls. We understand that this water stop can withstand settlements of at least 0.25 inches. We also understand that the Treatment Plant building will contain process equipment.

The Influent Tank Pad will consist of a 1,320 (one thousand three hundred twenty) square foot concrete pad at or near the existing ground surface. The Tank Pad will be unroofed with 4 (four) tank saddles on spread footings running laterally for the full width of the structure to support the influent tanks.

The 2 (two) Effluent Tanks will consist of 75,000 (seventy-five thousand) gallon capacity bolted or welded steel tanks measuring approximately 29 (twenty-nine) feet in diameter with a concrete ring-wall foundation. These tanks will be encased in a steel containment ring of approximately 42 (forty-two) feet in diameter by 16 (sixteen) feet high also on a concrete ring-wall foundation.

8.0 BUILDING FOUNDATIONS

8.1 Spread Footing Foundations

Based on the field and laboratory test results, it is our opinion that the proposed structures can be founded on spread footing foundation systems bearing on the natural clayey SAND and GRAVEL encountered below the existing TOPSOIL and FILL MATERIAL.

Two requirements must be fulfilled in the design of spread foundations. First, the foundation loads must be sufficiently less than the ultimate bearing capacity of the subsoil to ensure stability. Second, the estimated total and differential heave/settlement must not exceed an amount which will produce adverse behavior of the structure. For clayey SAND and GRAVEL, the allowable foundation settlement is usually exceeded before the allowable bearing capacity of the soil is reached. Thus, the allowable bearing pressure of spread footing foundations imposing loads directly, or indirectly, upon clayey SAND and GRAVEL is usually controlled by settlement considerations.

Based on our evaluation of subsurface conditions at this site, the spread footings bearing on gravelly SAND and GRAVEL may be designed as follows:

A)	Maximum Allowable Bearing Pressure*:	2,500 psf
B)	Minimum Continuous Footing Width:	1.5 feet
C)	Minimum Individual Footing Width:	2.0 feet
D)	Minimum Footing Depth:	3.0 feet

*Applies to the total of all dead and frequently applied live loads.

8.2 General Design Considerations

Continuous footings should be nominally reinforced to span any isolated soft spots which may occur at the bearing stratum elevation. Typical foundation unsupported spans should normally be less than 10 (ten) feet. If local soft spots are encountered at foundation bearing

depths, then the soft materials should be over-excavated and replaced or properly compacted prior to construction of spread footings.

During excavation of the footings, the bearing soils may be disturbed by conventional excavating equipment. Therefore, prior to the construction of spread footings, all loose materials encountered in the excavation should be removed prior to pouring concrete.

Foundation settlements are normally defined in terms of "total" and "differential" movement. "Total" movement refers to the maximum amount of movement that the foundation may experience as a whole. "Differential" movement refers to unequal movement that a foundation may experience over relatively short horizontal distances. "Differential" movements have been traditionally determined to be one-half of the "total" movement.

Settlements of spread and continuous footing foundations designed and constructed as recommended in this report could experience post-construction "total" settlements of up to 0.50 inches under the design loads.

The settlement experienced by slabs-on-grade will differ from foundation settlement. Therefore, the total foundation settlement estimate should be used as the differential settlement between any slab-on-grade and the building foundations.

8.3 Swelling Soil Considerations

Swell/Consolidation Tests performed on samples from this site (see Plates 5 through 7), indicate that the subsurface materials possess a swell potential varying from -0.2 (consolidation) to +8.1 (swell) percent, under surcharge pressures of 200 (two hundred) psf.

The swelling pressures associated with these tests varied from 0 (zero) to approximately 10,000 (ten thousand) psf. The swelling pressure is defined as the pressure that must be exerted on the sample in order that no volume change occurs.

Potential "swell damage risk" has been defined as follows:

Swell Potential (%)	Swelling Pressure (psf)	Swell Damage Risk
	0	None
- 0	0 - 1,000	Low
0 - 1	1,000 - 5,000	Medium
1 - 5	5,000 - 10,000	High
3 - 20	Over 10,000	Very High
Over - 20		

Based on the table shown above, the "swell damage risk" for subsurface materials at this site range from "none" to "very high" as described in the following paragraphs.

The clayey SAND and GRAVEL encountered to depths of 8.5 to 14 (fourteen) feet was found to have a "swell damage risk" rating of "none". This material is at the foundation level for the proposed structures.

The CLAY (severely weathered claystone bedrock) and WEATHERED CLAYSTONE BEDROCK has a "swell damage risk" rating of "medium" to "very high". This material was encountered immediately beneath the clayey SAND and GRAVEL. The "swell damage risk" of these materials generally increased with depth.

The SAND and GRAVEL soils at the foundation level as found at the site do not have swelling potential. The CLAY (severely weathered claystone bedrock) with "very high" swell po-

tential occurs at sufficient depth that it should not affect surface structures. However, as an added precaution in the event of catastrophic spills at the site, we recommend surface and subsurface drainage features as discussed in Section 12.0.

9.0 FLOOR SLAB CONSTRUCTION

The FILL MATERIAL encountered at the proposed floor slab elevations in general is not appropriate to support slab-on-grade construction. Consequently, we recommend that the FILL MATERIAL at all slab-on-grade locations be over-excavated and replaced to a depth of 2 (two) feet. Non-swell potential material, which meets the criteria outlined in Section 13.0 should be then used to replace the excavated material.

For floor slabs supported on "over-excavated and replaced" materials meeting the criteria described in Section 13.0, a modulus subgrade reaction of 150 (one hundred fifty) pci may be used. However, area loading which results in subgrade pressures greater than 1,500 (one thousand five hundred) psf should be supported on independent foundations. This may include some of the process equipment.

We recommend that the following design and construction details regarding floor slabs be followed to minimize potential damage to the structure.

A) Design and construct the floor slab to move independently of all bearing members ("floating slab construction"). Provide joints around columns and a maximum of every 15 (fifteen) feet center-to-center in the floor slab. Floor slabs should be nominally reinforced.

B) All pressurized waterlines below the floor slabs should be tested prior to, and immediately after, backfill operations. Any water leaks should be corrected immediately.

C) All utility line backfill below the floor slabs and within 10 (ten) feet of the exterior face of the slabs should be compacted to at least 95 (ninety-five) percent of the Maximum Dry Density, at $\pm$2 (two) points of the Optimum Moisture Content (OMC) as determined by the Modified Proctor Test (ASTM D-1557-78).

10.0 LATERAL EARTH PRESSURES

10.1 General

Vertical walls retaining soils on one side should be designed to resist lateral earth pressures. Walls which are restrained at the top by either a structural floor system or a structural roof system, are normally considered to be rigid and the "at rest" earth pressure condition should be considered in their design. Walls unrestrained at the top should be designed for "active" lateral earth pressures.

10.2 Lateral Earth Pressures

The following lateral earth pressure parameters can be used for design at the site for walls backfilled with material meeting the criteria presented in Section 13.0 of this report:

Lateral Earth Pressures (pcf – Equivalent Fluid Pressures)			Wall Friction Coefficient
Active	Passive	At-Rest	
35	350	45	0.4

11.0 EXCAVATION CONSIDERATIONS

11.1 Excavation

Based on the resistance of the ground to flight-auger penetration during drilling operations, visual inspection of the soil samples recovered, and the results of the penetration tests, it is our opinion that excavation of the proposed Groundwater Treatment Facility foundations can be accomplished using conventional excavating equipment. Some hard digging could be encountered in some of the dense clayier GRAVEL zones, however.

11.2 Dewatering

Groundwater was not encountered during drilling operations to terminal depths of 30 (thirty) feet. Based on the proposed foundation elevations, dewatering of the construction excavations should not be required.

11.3 Excavation Side Slopes

Cuts in the in-situ NATURAL SOILS may stand on nearly vertical slopes for at least a brief period of time. However, near vertical cuts in these materials cannot be considered safe, even for short durations. If men have to work near or within the excavation, bracing or sloped walls will be required. If bracing is not economically feasible, excavation sideslopes should be sloped back to a safe angle in conformance with applicable OSHA regulations. It is the Contractor's responsibility to provide an excavation which is safe for his men to work in. Generally, a dry excavation cut in granular soils can safely stand at slopes ranging from 1-1/2 to 2 (two) horizontal (H), to 1 (one) vertical (V). However, moist of the NATURAL SOILS encountered in our borings contain SILT and CLAY and should stand safely at 1H to 1V. Excavation slopes steeper than 1-1/2H to 1V should be observed by a geotechnical engineer to confirm that stable materials are exposed.

The Contractor should be required to provide a plan indicating his method of excavation support to be reviewed by the Geotechnical Engineer, at least 14 (fourteen) days prior to the start of excavation operations.

Braced excavations where the following conditions exist should be reviewed and if necessary, designed by a Structural Engineer familiar in the design of bracing systems:

A) Excavation depth exceeds 6 (six) feet.

B) Where material (including excavated soil) are stockpiled within 10 (ten) feet of the sides of the trench, or where nearby footings, vehicular traffic, storage tanks, etc., may influence the stability of excavation slopes.

12.0 SURFACE AND SUBSURFACE DRAINAGE SYSTEM

12.1 Permanent Subsurface Drainage System

As indicated in Section 5.5, groundwater was not encountered in any of our borings to terminal depths of from 12 (twelve) to 30 (thirty) feet below the existing ground surface, which corresponds to approximate elevations of from 5,980 (five thousand nine hundred eighty) to 5,962 (five thousand nine hundred sixty-two) feet.

However, as added precaution in the event of a catastrophic water spill at the site, we recommend that a peripheral subsurface drainage system be considered around the foundation of the proposed structures.

The purpose of this system would be to reduce the possibility of any spillage from migrating through the permeable sand and gravel present near the surface and saturating the underlying expansive clay and claystone bedrock.

The subsurface drainage system should be constructed at least 18 (eighteen) inches below the proposed slab elevation and consist of a 4 (four)-inch diameter perforated PVC pipe, or drain tile, installed in a gravel-filled trench. The drain pipe should be connected to a positive gravity outfall or collection sump not subject to freezing.

Because the surrounding soils have a fine-grained component, a material such as "Mirafi 140N" or "Filter Sleeve" should be wrapped around the pipe to avoid clogging of the drain by these soils in the future. These materials will allow water to go through them, but will not permit soils to penetrate them.

12.2 Surface Drainage

The following surface drainage provisions should be observed:

A) The first 6 (six) feet (horizontally) of material around the building limits should be sloped away from the building a minimum of 12 (twelve) inches to help in rapid surface drainage.

B) Roof downspouts should discharge on splashblocks or asphaltic concrete beyond the limits of the foundation backfill and a minimum of 5 (five) feet beyond the building lines.

13.0 FILL/EMBANKMENT MATERIALS

We recommend the following backfill properties and compaction criteria for the subject site.

13.1 Non-Swell Potential Material Properties

Non-swell potential material used as backfill beneath the slabs on the site should meet the following gradation characteristics and soil index properties:

Sieve Designation	Passing by Weight (percent)
1	100
1/2"	80 - 100
3/8"	60 - 100
No. 4	50 - 75
No. 40	10 - 50
No. 200	5 - 12

A)	Liquid Limit:	<25
B)	Plasticity Index:	<6
C)	Swell Index under 200 psf Surcharge Load:	<0.1%

Based on our exploratory borings and laboratory test results, it does not appear that the on-site NATURAL SOILS meet this criteria, therefore backfill material should be imported.

13.2 Compaction Requirements

The following general compaction specifications should be observed on this site for the backfill material described above:

A) Non-Expansive Materials

	Area	Compaction*	Moisture Content
1)	Below structures, paved areas & floor slabs	95%, or higher	Within 2 (two) points of the Optimum Moisture Content (OMC)

	Area	Compaction*	Moisture Content
2)	Backfill around structures, including walls	90%, or higher	Within 2 (two) points of the OMC
3)	Trenches	95%, or higher	Within 2 (two) points of the OMC
4)	Driveways and parking lots	95%, or higher	Within 2 (two) points of the OMC
5)	Landscape areas	85%, or higher	Within 2 (two) points of the OMC

* Modified Proctor Test (ASTM D-1557-78)

We recommend that compaction and moisture be closely monitored during fill operations on this site in order to minimize future potential structural damage.

14.0 SUBGRADE PREPARATION AND DENSIFICATION

14.1 Building Pads and Foundations

The foundation design parameters we have presented can be used for the proposed structures if the earthwork construction procedures outlined in the following paragraphs are properly accomplished.

Building pads and foundation construction should be accomplished as follows:

A) Footings: Following excavation to footing elevations, the existing soils in the bottom of the excavation should remain undisturbed. Any loose material should be removed prior to concrete placement. Any soft or yielding soils should be removed and replaced with compacted backfill as described in Section 13.0.

B) Slabs: Portions of the areas which will be overlain by slabs are presently underlain by up to 2 (two) feet of sand, gravel, and cobble FILL MATERIAL. This material should be removed and replaced with suitable compacted backfill material as described in Section 13.0.

C) Required Backfill Testing: We recommend that soil density and moisture tests be performed on a daily continuous basis while backfill material is being placed.

15.0 DESIGN AND CONSTRUCTION DETAILS

The design and construction details described in the following subsections are also recommended.

15.1 General

A) Backfill around the buildings should be compacted to the criteria indicated in Section 13.2 of this report.

B) All utility line backfill below the floor slabs and within 6 (six) feet of the exterior face of the slabs should be compacted to the appropriate density indicated in Section 13.2 of this report for the appropriate area where the fill is being placed.

15.2 Slabs-on-Grade

A) Design and construct the floor slabs of the facility to move independently of all bearing members (floating slab construction). Provide joints around columns and on a maximum of every 15 (fifteen) feet center-to-center, in floor slab-on-grade areas.

B) Backfill material beneath the floor slabs-on-grade should be as described in Section 13.0 of this report.

16.0 CHEMICAL TESTS

16.1 Soluble Sulfate Test

Soluble sulfate tests performed on NATURAL SOIL samples from this site (see Table I) indicated concentrations from 0.012 to 0.023 percent. These concentrations represent a "negligible" relative degree of sulfate attack on concrete.

The relative degree of attack is based on a range of "negligible", "moderate", "severe" and "very severe" as described in Standard 318, American Concrete Institute (ACI) Manual of Concrete Practice, Part 3, 1986. Based on the above mentioned soluble sulfate test results, it is appropriate to use Type I cement in all concrete exposed to the NATURAL SOILS at the site.

16.2 pH

The pH test results (see Table 1) indicate from a slightly "basic" to a slightly "acidic" condition in the soil samples tested.

17.0 MISCELLANEOUS

The analyses and recommendations submitted in this report are based upon the data obtained form the 6 (six) test borings performed at the locations indicated on Plate 2.

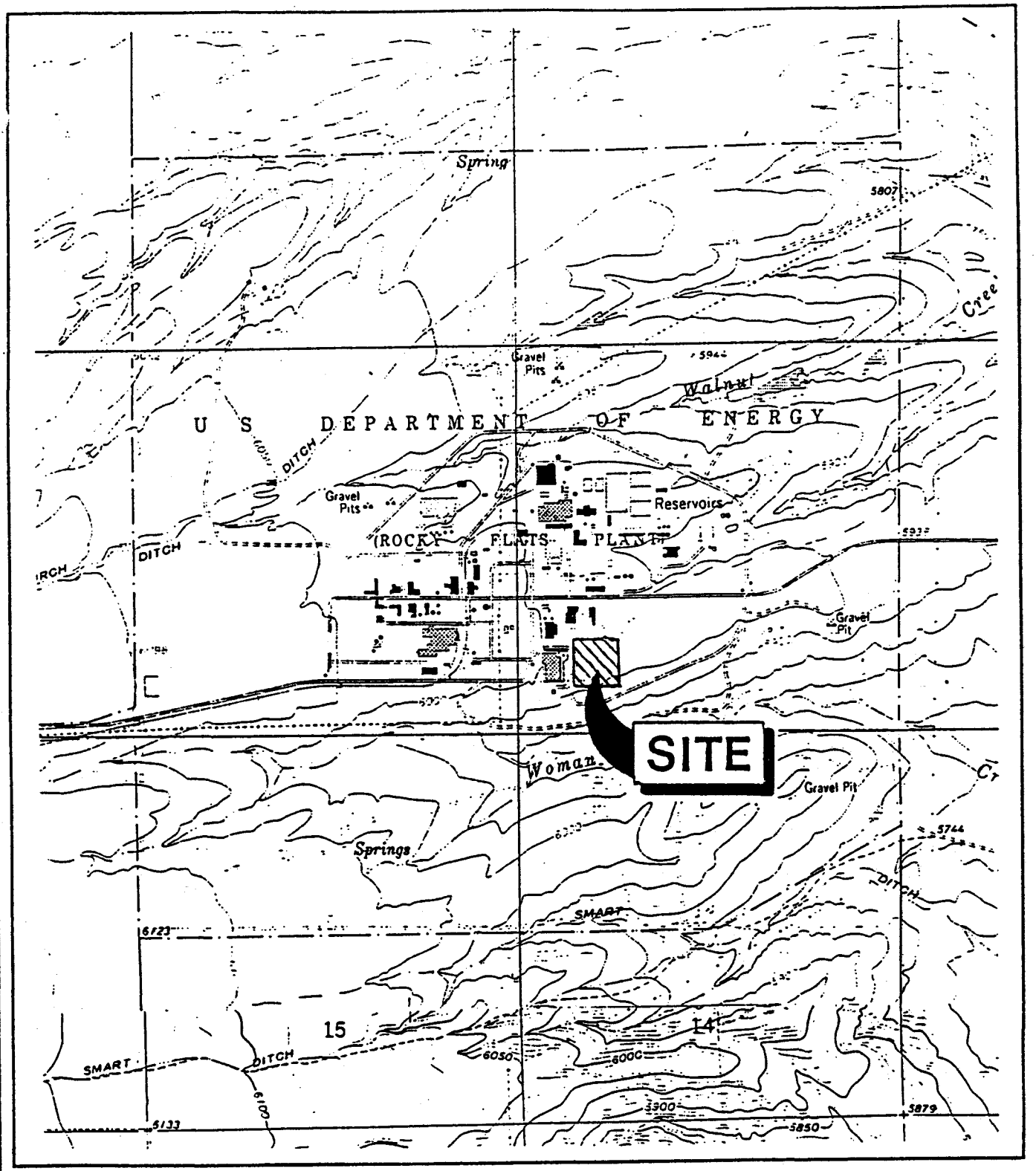
In any foundation investigation, it is necessary to assume that foundation conditions do not change greatly from those indicated by our exploratory borings. However, our experience has shown that anomalies between borings sometimes become apparent during the construction stages of the project. This report does not reflect any of these anomalies which may occur between borings.

Because the nature and extent of variations between borings may not become evident until the beginning of construction, we recommend that Aguirre Engineers, Inc., who is familiar with the subsurface conditions at this site, observe the excavation, foundation construction and backfill operations and perform appropriate soil tests on a full-time basis.

If variations in the subsurface conditions are encountered during construction, it may be necessary for a re-evaluation of the recommendations contained in this report. If any unforeseen subsurface conditions are encountered, we should be notified immediately.

We have presented professional judgments and criteria on design alternatives in this report. These criteria are based partly on our evaluation of the technical information gathered and partly on our understanding of the characteristics of the project as compared with similar subsurface conditions in the area.

The engineering work performed and judgments rendered meet the standard of care for our profession, for this area. Our company is not responsible for the conclusions, opinions or recommendations made by others on the data we have presented.



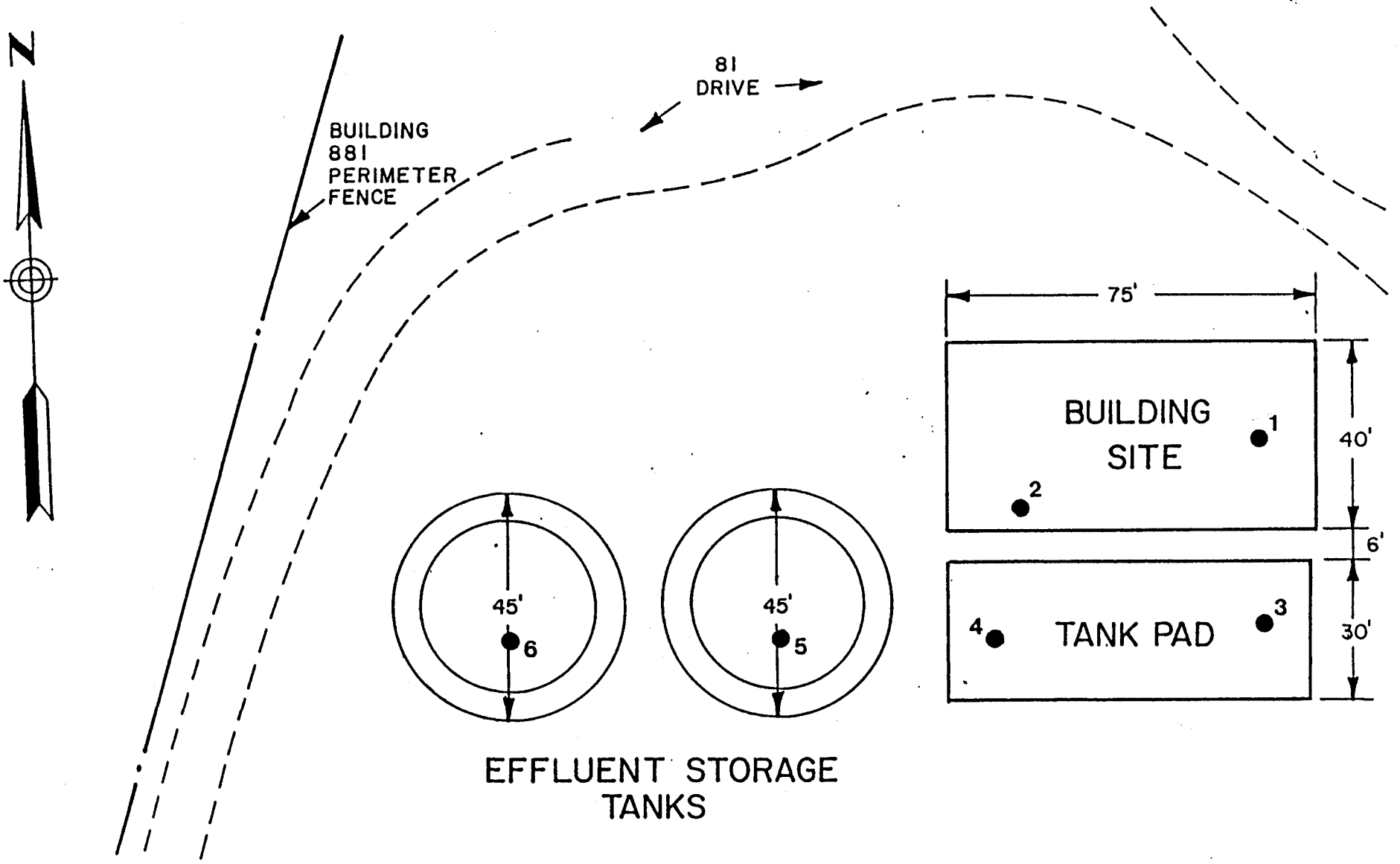
Taken from U.S.G.S. Golden, Colorado Quadrangle, 1965 (photorevised 1980) and U.S.G.S. Louisville, Colorado Quadrangle, 1965 (photorevised 1979).

SITE LOCATION MAP

SUBSURFACE INVESTIGATION AND ENGINEERING ANALYSIS REPORT
GROUNDWATER TREATMENT BUILDING
ROCKY FLATS NUCLEAR WEAPONS PLANT
JEFFERSON COUNTY, COLORADO

AGUIRRE ENGINEERS, INC.
Geotechnical and Materials Consultants
P.O. BOX 3814
ENGLEWOOD, COLORADO
80155-3814 U.S.A.

DRAWN BY: WFB	SCALE: Vertical N/A Horizontal 1" = ±2000'	
CHECKED BY: BH		
DATE: 10/5/89	JOB NO. 18,023-0.1	PLATE 1



BORING LOCATION MAP

SUBSURFACE INVESTIGATION AND
ENGINEERING ANALYSIS REPORT
GROUNDWATER TREATMENT BUILDING
ROCKY FLATS NUCLEAR WEAPONS PLANT
JEFFERSON COUNTY, COLORADO

AGUIRRE ENGINEERS, INC.
Geotechnical and Materials Consultants
P.O. BOX 3814
ENGLEWOOD,
COLORADO
80155-3814 U.S.A.

DRAWN BY: WFB
CHECKED BY: BH
DATE: 10/5/89

SCALE: Vertical N/A
Horizontal 1" = ±30'

JOB NO. 18,023-0.1

PLATE 2

INDEX

Section	
	DIVISION 1 - GENERAL REQUIREMENTS
01100	Special Contract Requirements
01300	Submittals
01500	Temporary Facilities, Controls and Special Project Requirements
01610	Material Handling and Waste Disposal
01700	Construction Safety Requirements
	DIVISION 2 - SITE WORK
02200	Earthwork
	DIVISION 3 - CONCRETE
03100	Concrete Formwork
03200	Concrete Reinforcement
03300	Cast-In-Place Concrete
03600	Grout
03601	Nonshrink Grout
	DIVISION 9 - FINISHES
09900	Painting
	DIVISION 13 - SPECIAL CONSTRUCTION
13208	Welded Steel Effluent Storage Tanks and Foundations
	APPENDIX
	Subsurface Investigation and Engineering Analysis Report
	DRAWINGS

LEGEND

TOPSOIL

FILL MATERIAL: consisting of clayey SAND, GRAVEL and COBBLE, loosely consolidated.

SAND AND GRAVEL: clayey, trace to some silt, moist to very moist, medium dense to very dense, light brown to red brown (SC-GC).

CLAY (severely weathered claystone bedrock): moist, very stiff to hard, light gray to gray, light brown (CL).

CLAYSTONE BEDROCK: weathered, dry to moist, hard, gray to dark gray, brown.

NOTES

1) The borings were drilled on September 26, 1989 with a 4.00-inch Outside Diameter (O.D.), solid-stem, continuous flight power auger.

2) 29 (twenty-nine) indicates that 29 (twenty-nine) blows of a 140 (one hundred forty) pound hammer falling 30 (thirty) inches were required to drive the sampler 12 (twelve) inches, or the number of inches indicated.

3) Stratification lines represent the approximate boundary between soil types the actual transition may be gradual.

4) The test boring logs show subsurface conditions at the dates and locations indicated. It is not warranted that they are representative of subsurface conditions at other locations and times.

5) The boring were physically located in the field by the Project Engineer of Aguirre Engineers, Inc. using proposed building survey stakes as a reference. Estimated boring elevations were obtained from the "Phase I Construction Site and Grading Plan", provided by Engineering-Science, dated August, 1989.

   The boring locations and elevations are adequate for the purpose of this report, but should be considered as approximate for any other use.

6) Groundwater was not encountered in any of our borings at terminal depths from 12 (twelve) to 30 (thirty) feet below the existing ground surface during drilling operations (September 26, 1989).

   All borings were backfilled with grout immediately following drilling operations. No subsequent groundwater reading were possible.

LEGEND AND NOTES

SUBSURFACE INVESTIGATION AND
ENGINEERING ANALYSIS REPORT
GROUNDWATER TREATMENT BUILDING
ROCKY FLATS NUCLEAR WEAPONS PLANT
JEFFERSON COUNTY, COLORADO

AGUIRRE ENGINEERS, INC.
Geotechnical and Materials Consultants
P.O. BOX 381
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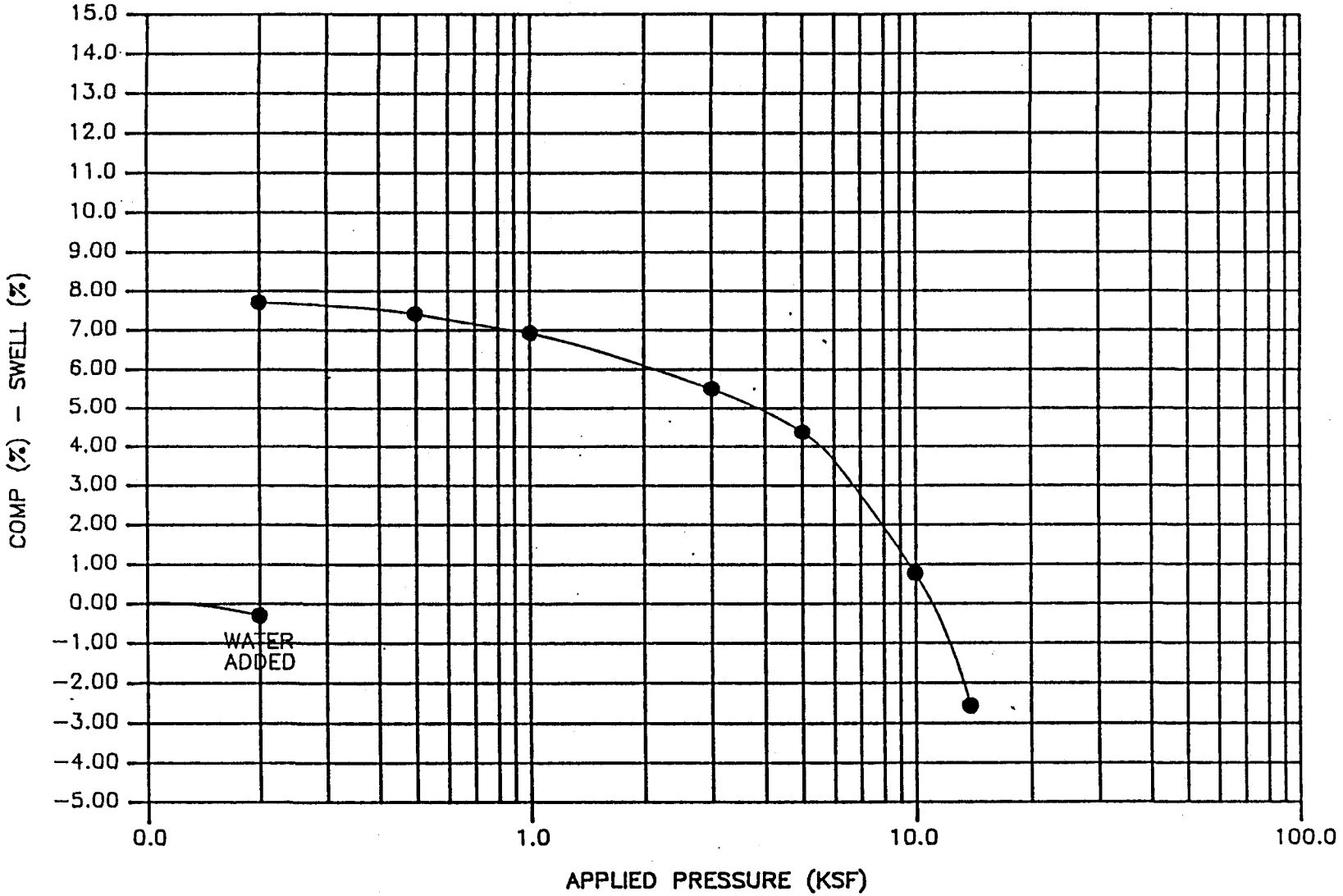
COLORADO
80155-3814 U.S.A

DRAWN BY: WFB	SCALE: Vertical N/A	
CHECKED BY: BH	Horizontal N/A	
DATE: 10/5/89	JOB NO. 18,023-0.1	PLATE 4



BORING NO.	SAMPLE NO.	DEPTH (FEET)	NATURAL DRY DENSITY (PCF)	MOISTURE CONTENT (%)	SOIL DESCRIPTION
1		19–20	110.5	19.0	CLAYSTONE BEDROCK, weathered, trace sand, light gray

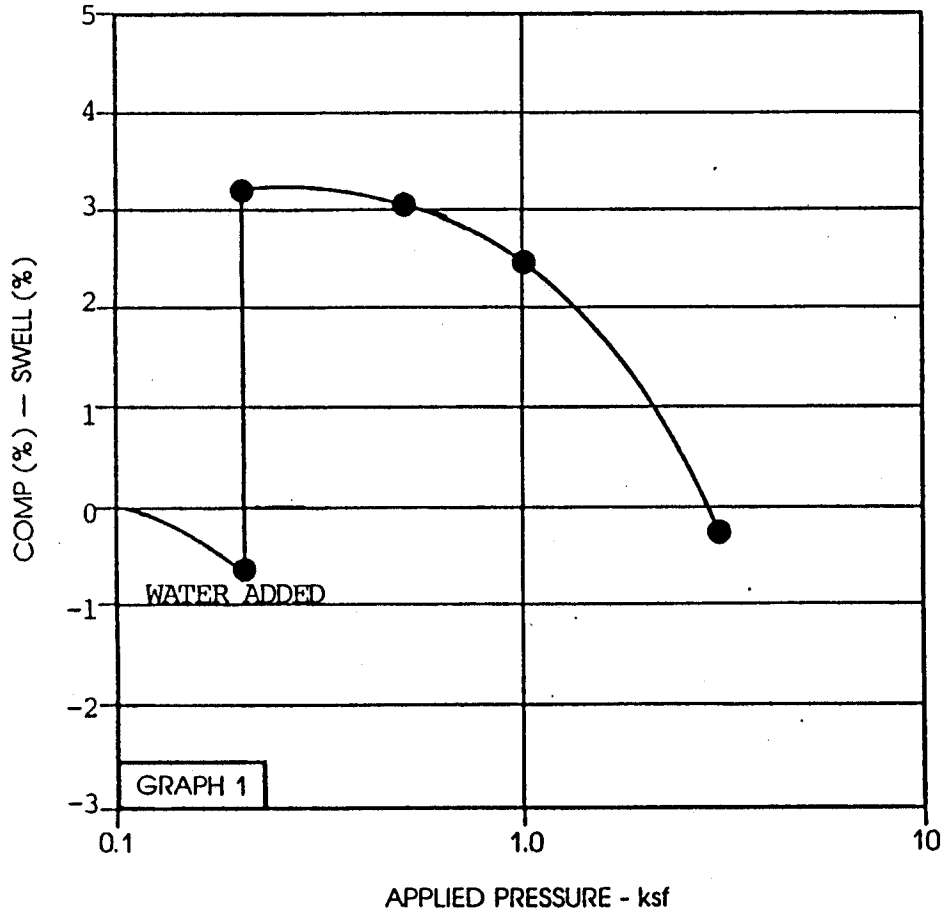
AGUIRRE ENGINEERS, INC.

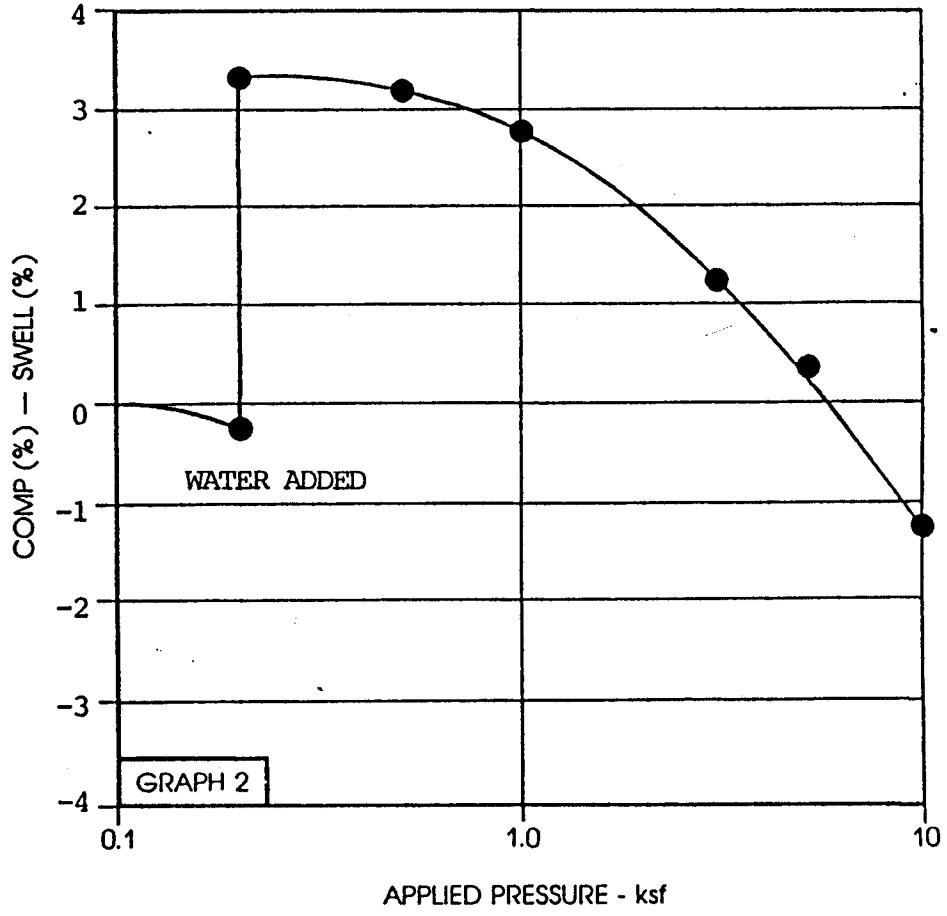
SWELL–CONSOLIDATION TEST

DRAWN BY: WFB
CHECKED BY: BH
DATE: 10/6/89

JOB NO. 18,023–0.1

PLATE 5





GRAPH NO.	BORING NO.	SAMPLE NO.	DEPTH (FEET)	NATURAL DRY DENSITY (PCF)	NATURAL MOISTURE (%)	SOIL DESCRIPTION
1	3		14-15	102.2	23.2	CLAY, (severely weathered claystone bedrock), trace sand, light gray. (CL)
2	4		19-20	115.3	15.6	CLAYSTONE BEDROCK, weathered, gray

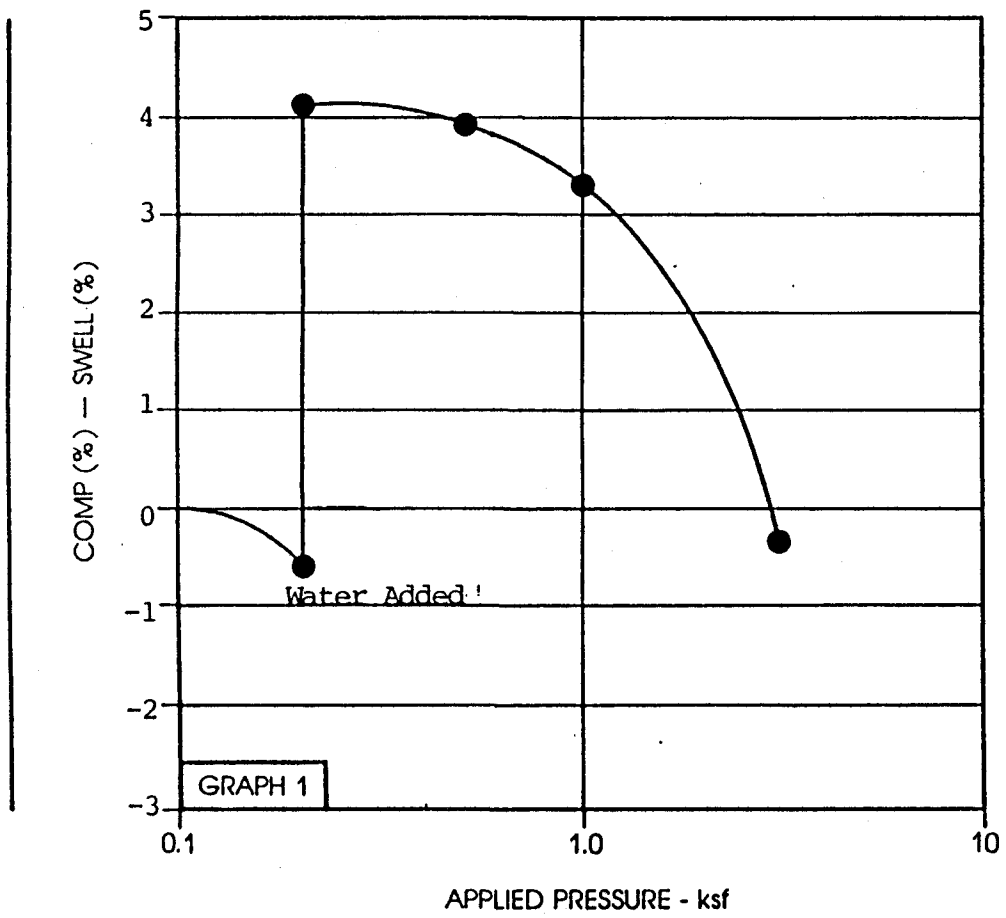
AGUIRRE ENGINEERS, INC.

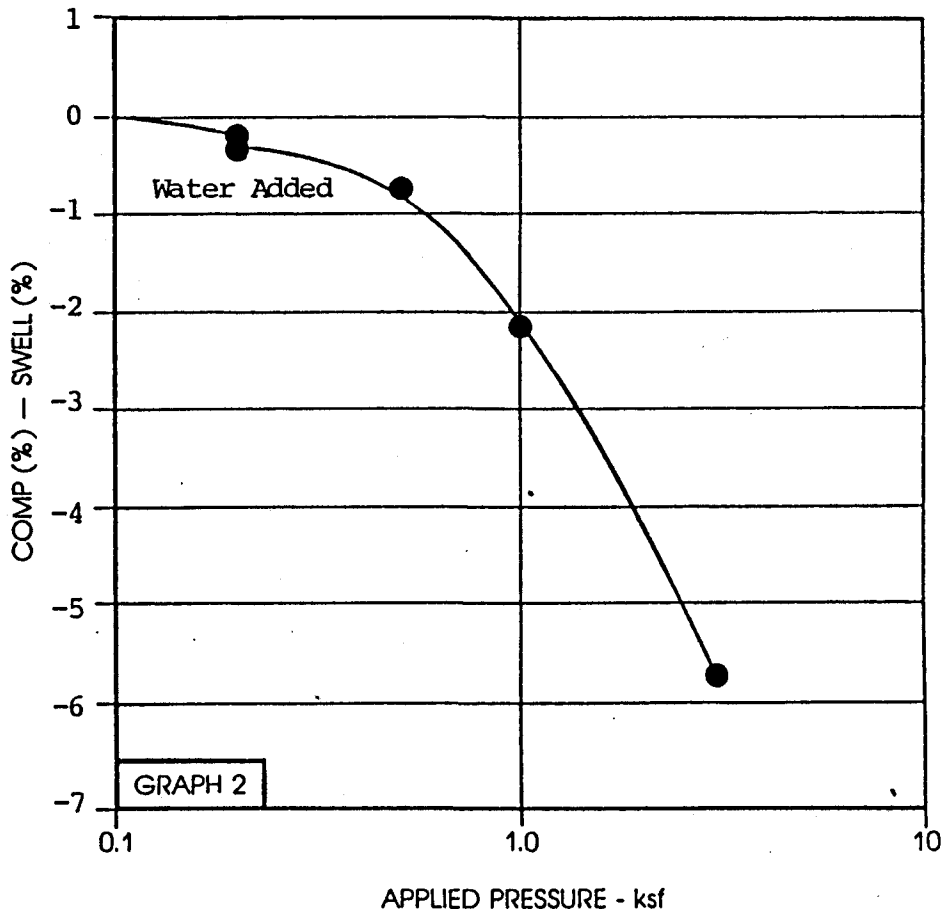
SWELL-CONSOLIDATION TEST

DRAWN BY: AF
CHECKED BY: BM
DATE: 10/2/92

JOB NO. 18,023-0.1

PLATE 6





GRAPH NO.	BORING NO.	SAMPLE NO.	DEPTH (FEET)	NATURAL DRY DENSITY (PCF)	NATURAL MOISTURE (%)	SOIL DESCRIPTION
1	5		14-15	105.0	21.2	CLAY (severely weathered claystone bedrock) trace sand, trace gravel, light brown (CL)
2	6		9-10	110.1	5.9	SAND AND GRAVEL, clayey, light brown (SC-GC)

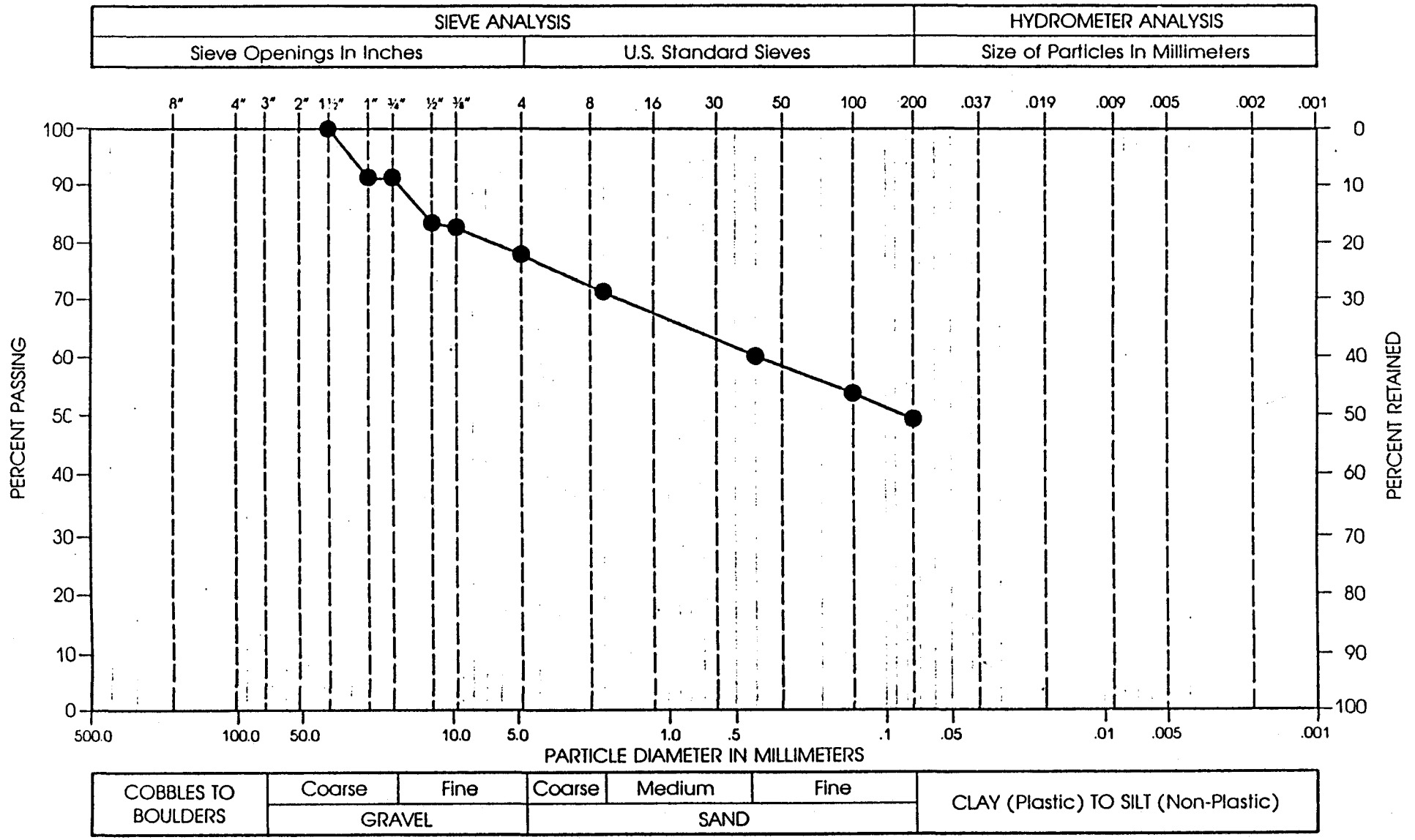
AGUIRRE ENGINEERS, INC.

SWELL-CONSOLIDATION TEST

DRAWN BY: AF
CHECKED BY: BM
DATE: 10/2/89

JOB NO. 18,023-0.

PLATE 7



GRAPH NO	BORING NO	SAMPLE NO.	DEPTH (FEET)	NATURAL DRY DENSITY (PCF)	NATURAL MOISTURE (%)	PL	PI	LL	SOIL DESCRIPTION
	3		4-5.5						SAND and GRAVEL, clayey, light brown (SC-GC)

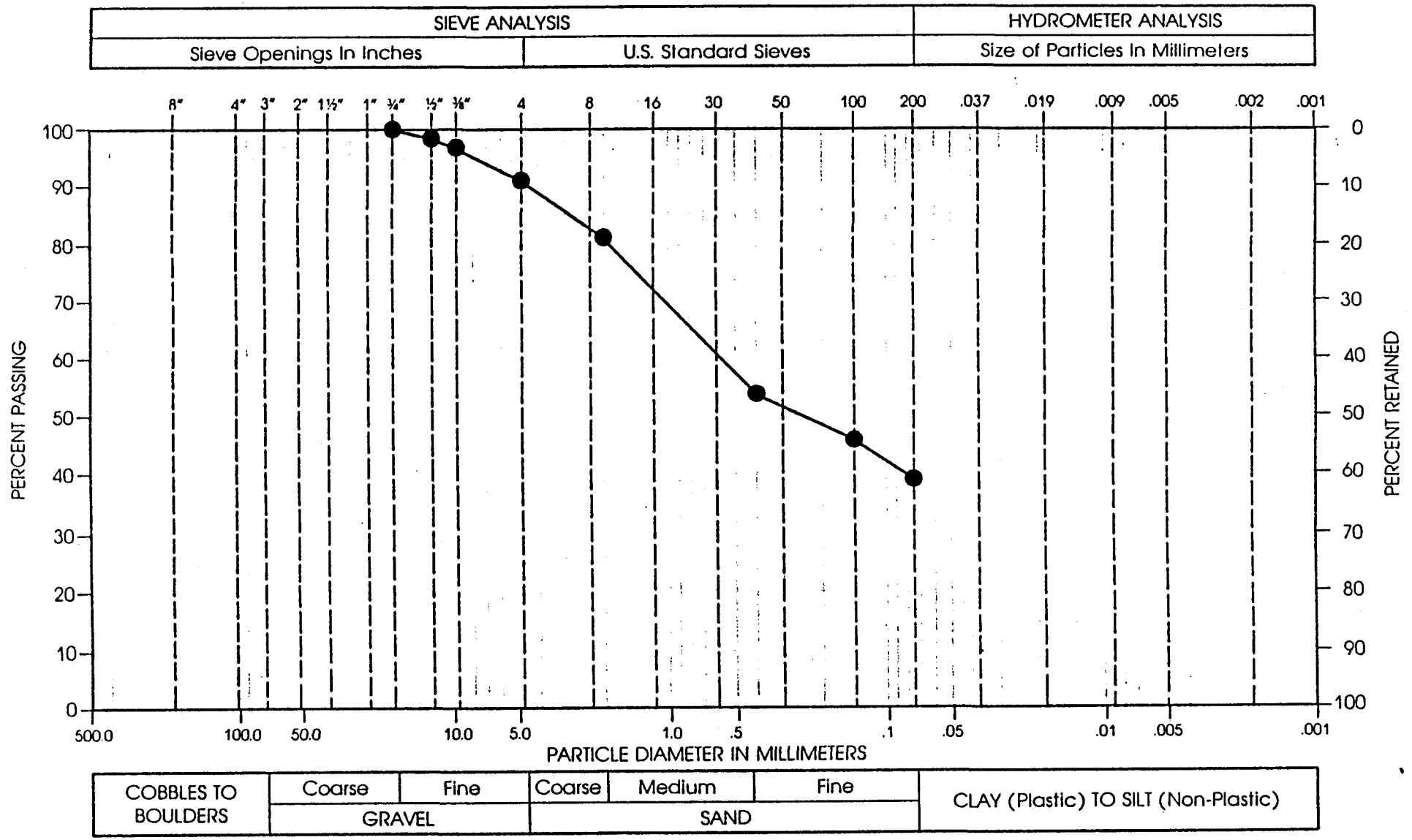
AGUIRRE ENGINEERS, INC.

GRADATION ANALYSIS

DRAWN BY: AF
CHECKED BY: BM
DATE: 10/4/89

JOB NO. 18,023-0.1

PLATE 8



GRAPH NO	BORING NO.	SAMPLE NO.	DEPTH (FEET)	NATURAL DRY DENSITY (PCF)	NATURAL MOISTURE (%)	PL	PI	LL	SOIL DESCRIPTION
	4		4-5	103.6	9.1				SAND, clayey, trace gravel, light brown (SC)

AGUIRRE ENGINEERS, INC.

GRADATION ANALYSIS

DRAWN BY: AF
CHECKED BY: BM
DATE: 10/3/89

JOB NO. 18,023-0.1

PLATE 9

BORING NO.	SAMPLE NO.	DEPTH (FEET)	SAMPLE TYPE (SEE NOTE 1)	NATURAL DRY DENSITY (pcf)	NATURAL MOISTURE (%)	FINES (%)	ATTERBERG LIMITS			UNCONFINED COMPRESSIVE STRENGTH (psf)	SWELL INDEX (%)	WATER SOLUBLE SULFATES (%)	ADDITIONAL TEST RESULTS ATTACHED (SEE NOTE 2)	SOIL DESCRIPTION	UNIFIED SOIL CLASSIFICATION
							PL	PI	LL						
1		3-4	CA	N/A	N/A							0.012 pH=6.54		SAND and GRAVEL, clayey, light brown	SC-GC
1		19-20	CA	110.5	19.0	99.7	26	12	38		+8.1		SW	CLAYSTONE BEDROCK, weathered, trace sand, light gray	
2		14-15	CA	106.3	20.3	99.3								CLAY (severely weathered claystone bedrock), trace sand, light gray	CL
3		4-5.5	SS	N/A	N/A	49.4							GA	SAND and GRAVEL, clayey, light brown	SC-GC
3		14-15	CA	102.2	23.2	96.0	27	22	49		+3.8		SW	CLAY (severely weathered claystone bedrock), trace sand, light gray	CL
4		4-5	CA	103.6	9.1	38.7						0.023 pH=8.36	GA	SAND, clayey, trace gravel, light brown	SC
4		19-20	CA	115.3	15.6						+3.6		SW	CLAYSTONE BEDROCK, weathered, gray	

NOTE 1 – SAMPLE TYPE
AD – Air Dried
AS – Auger Sample
BS – Bag Sample
CA – California Sample
HD – Hand Drive
SS – Standard Spoon
ST – Shelby Tube Sample
RM – Remolded Sample

NOTE 2 – ADDITIONAL TEST RESULTS ATTACHED
C_1 – Unconfined Compression
C_2 – Miniature Vane Shear
C_3 – Pocket Penetrometer
C_4 – Pocket Vane
CT – Consolidation Test
GA – Gradation Analysis
PT – Proctor
SW – Swell–Consolidation test
TT – Triaxial Test

AGUIRRE ENGINEERS, INC.
Geotechnical and Materials Consultants

SUMMARY OF LABORATORY TEST RESULTS

PROJECT NO. 18,023-0.1

TABLE 1

BORING NO.	SAMPLE NO.	DEPTH (FEET)	SAMPLE TYPE (SEE NOTE 1)	NATURAL DRY DENSITY (pcf)	NATURAL MOISTURE (%)	FINES (%)	ATTERBERG LIMITS			UNCONFINED COMPRESSIVE STRENGTH (psf)	SWELL INDEX (%)	WATER SOLUBLE SULFATES (%)	ADDITIONAL TEST RESULTS ATTACHED (SEE NOTE 2)	SOIL DESCRIPTION	UNIFIED SOIL CLASSIFICATION
							PL	PI	LL						
5		14-15	CA	105.0	21.2	97.1	26	13	39		+4.6		SW	CLAY (severely weathered claystone bedrock) trace sand, trace gravel, light brown	CL
5		29-30	CA	105.3	21.9	96.1	28	20	48					CLAYSTONE BEDROCK, weathered, gray	
6		9-10	CA	110.1	5.9						-0.2		SW	SAND and GRAVEL, clayey, light brown	SC-GC

NOTE 1 – SAMPLE TYPE
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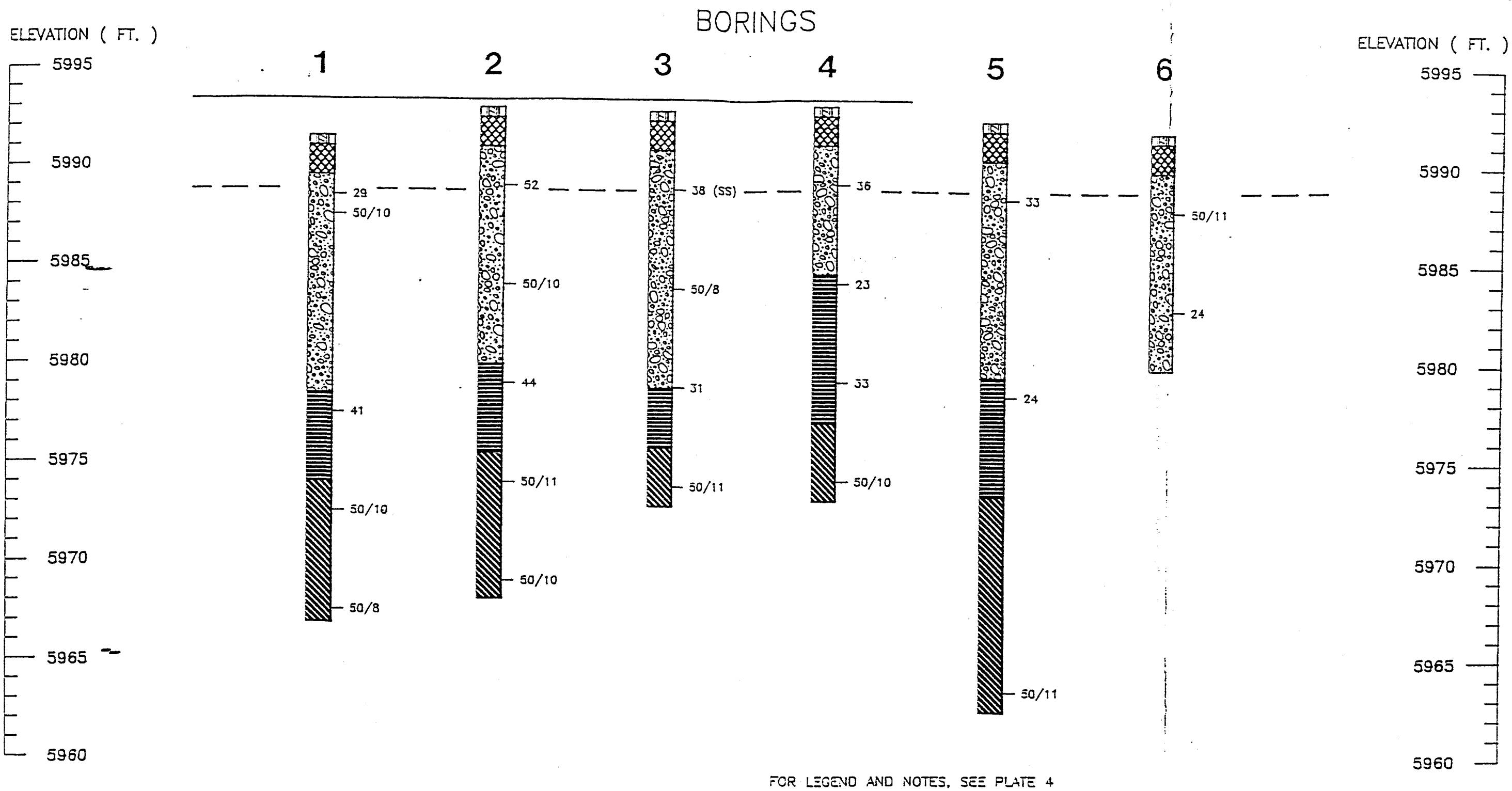
AGUIRRE ENGINEERS, INC.
Geotechnical and Materials Consultants

SUMMARY OF LABORATORY TEST RESULTS

PROJECT NO. 18,023-0.1

TABLE 1

DRAWINGS



FOR LEGEND AND NOTES, SEE PLATE 4

LOG OF BORINGS

SUBSURFACE INVESTIGATION AND
ENGINEERING ANALYSIS REPORT
GROUNDWATER TREATMENT BUILDING
ROCKY FLATS NUCLEAR WEAPONS PLANT
JEFFERSON COUNTY, COLORADO

AGUIRRE ENGINEERS, INC.
Geotechnical and Materials Consultants
P.O. BOX 3814
ENGLEWOOD, COLORADO
80155-3814 U.S.A.

DRAWN BY: WFB
CHECKED BY: EH
DATE: 10/5/89

SCALE: Vertical 1" = 5'
Horizontal N/A

JOB NO. 18,023-0.1

PLATE 3

ROCKY FLATS PLANT

Remedial Action 881 HS, 881
Government Furnished Equipment
Effluent Storage Tanks

FACILITIES ENGINEERING
Golden, Colorado 80402-0464

INDEX OF DRAWINGS

GENERAL

38548-X09	TITLE SHEET AND INDEX
38548-X10	AREA PLOT PLAN

STRUCTURAL

38548-307	EFFLUENT TANK FOUNDATION AND DETAILS

MECHANICAL

38548-507	EFFLUENT TANK SECTIONS AND DETAILS
38548-508	EFFLUENT TANK MECHANICAL DETAILS
38548-509	EFFLUENT TANK DETAILS

A	ORIGINAL ISSUE	11/09/90			986147
ISSUE	DESCRIPTION	DATE	RFP	DOE CLASS	JOB NO.

KEYWORDS

TOLERANCES: FRACT. ± ; ANGLE ± ; DEC. ± ; UNLESS NOTED OTHERWISE

REMOVE BURRS AND SHARP EDGES

NEXT ASSEMBLY

	BY	DATE
DESIGNED	DJH	07/31/90
DRAWN	SST	07/31/90
CHECKED	WJK	07/31/90
APPROVED	GSH	11/09/90
RELEASED	WJK	11/09/90
APPROVED (QA)		
APPROVED (DOE)		

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS OFFICE GOLDEN, COLORADO

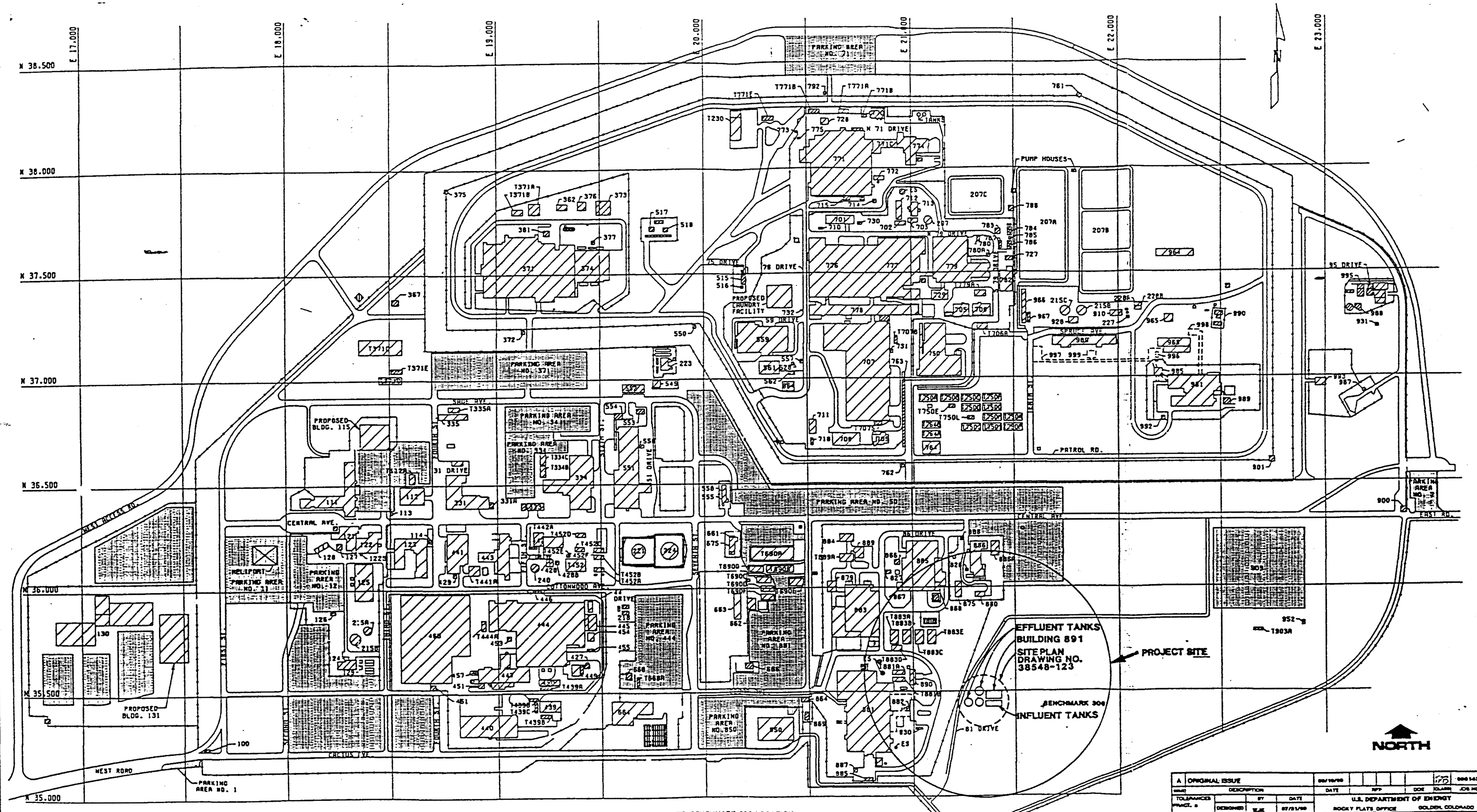
ROCKY FLATS PLANT
P.O. BOX 464
GOLDEN, COLORADO 80402

Remedial Action 881 HS, 881
Index and Title Sheet

ENGINEERING-SCIENCE
DESIGN • RESEARCH • PLANNING

MASTER | SCALE: NONE | SIZE: D | DRAWING NUMBER: 38548-X09 | ISSUE: A | SHEET: 1 OF 6

COMPUTER GENERATED DRAWING NO MANUAL CHANGES ALLOWED



NOTE: BENCHMARK 306 LOCATION

	NORTHINGS	EASTINGS
PLANT COORDINATES	35439.9190	21621.3987
ES COORDINATES	748425.2411	2084732.4820
ELEVATION	5990.35	

DESCRIPTION: SET #5 REBAR WITH 1 1/2" ALUMINUM CAP FLUSH STAMPED "306" ON SOUTH SLOPE OF HILL, NEAR CONTRACTOR STORAGE AREA.

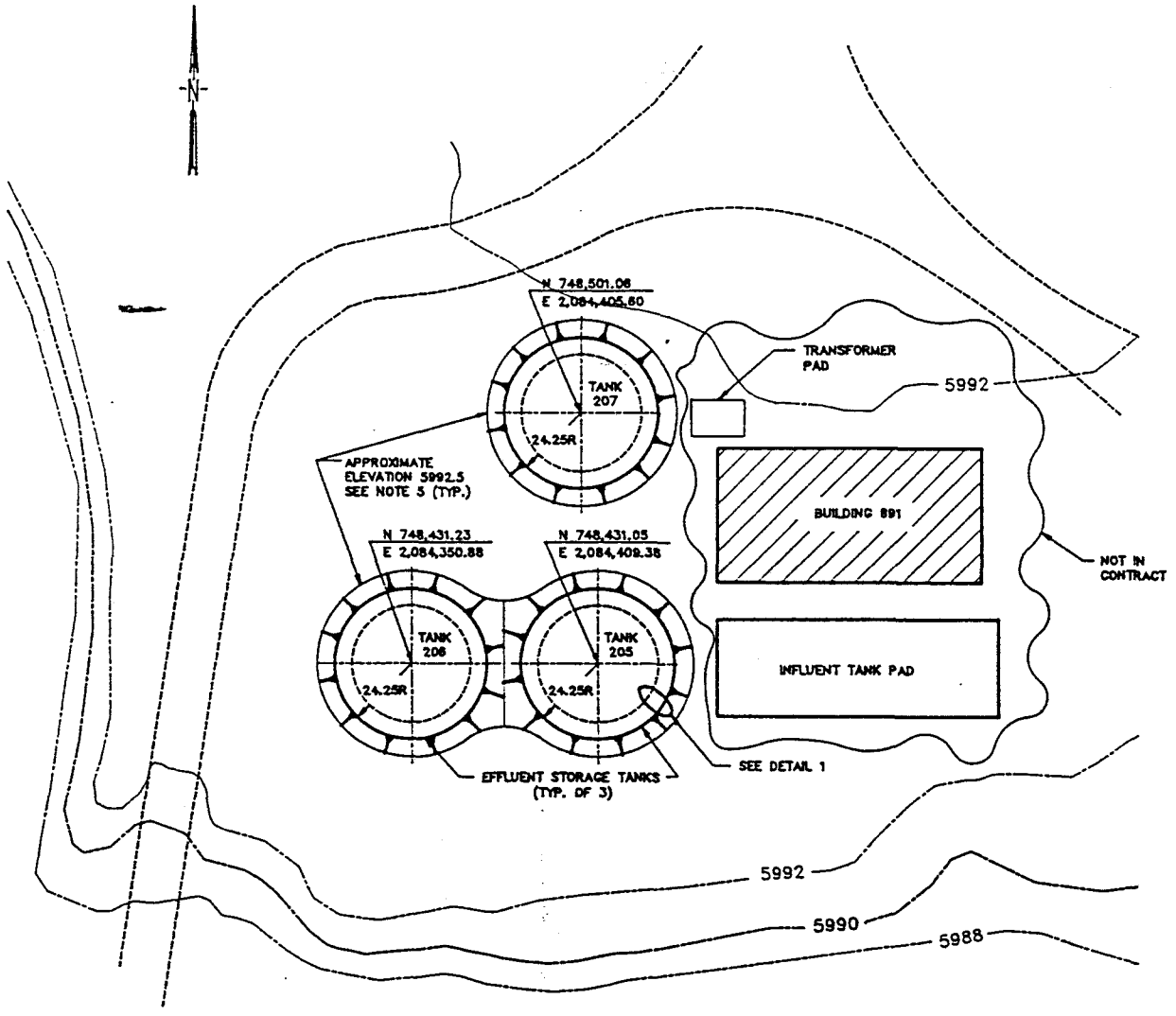
A ORIGINAL ISSUE

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS OFFICE GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402

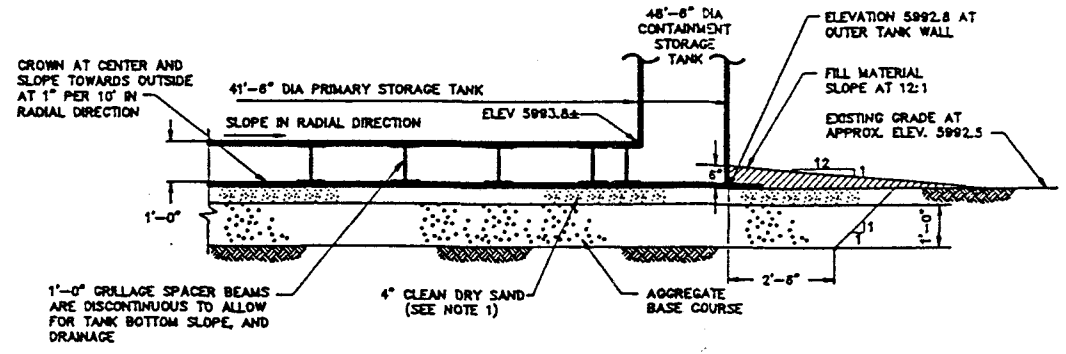
REMEDIAL ACTION 881 HS, 881
AREA PLOT PLAN

SCALE: AS SHOWN
SIZE: D
DRAWING NUMBER: 38548-X10
ISSUE: A
SHEET: 2 OF 6



SITE AND GRADING PLAN

NOT TO SCALE



DETAIL 1

SCALE: 1/2" = 1'-0" SEE NOTES

NOTE:

1. THE SAND BASE AND AGGREGATE BASE SHALL BE COMPACTED TO A MINIMUM 90 PERCENT MAXIMUM DENSITY, PER ASTM 1557, AT OPTIMUM MOISTURE CONTENT.
2. SAND GRADATION SPECIFICATION:
   - 85% TO 100% PASSING # 4 SIEVE
   - 80% TO 100% PASSING # 8 SIEVE
   - 50% TO 85% PASSING # 16 SIEVE
   - 25% TO 60% PASSING # 30 SIEVE
   - 10% TO 30% PASSING # 50 SIEVE
   - 2% TO 10% PASSING #100 SIEVE
   - 0% TO 3% PASSING #200 SIEVE
3. THE AGGREGATE BASE COURSE SHALL BE COLORADO DIVISION OF HIGHWAYS, STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, CLASS 6, CLASSIFIED AS FOLLOWS:

SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING SQUARE MESH SIEVES
3/4 INCH	100
NO. 4	30–65
NO. 8	25–55
NO. 200	3–12

4. THE TANK FOUNDATION DESIGN SHOWN HERE IS THE MINIMUM ACCEPTABLE DESIGN. TANK FOUNDATIONS SHALL BE COMPATIBLE WITH THE TANK DESIGN AND ARE THE RESPONSIBILITY OF THE CONTRACTOR, SUBJECT TO BUYER APPROVAL. SEE SPECIFICATIONS.
5. CONTRACTOR SHALL SLOPE SOIL AWAY FROM EFFLUENT TANKS AT 12:1 TO MEET EXISTING GRADE. APPROXIMATE ELEVATION OF EXISTING GRADE IS 5992.5

ISSUE	DESCRIPTION	DATE	APP	DOC CLASS	JOB NO.
A	ORIGINAL ISSUE	11/09/90		TPS	986147

		BY	DATE
TOLERANCES FRACT. ±	DESIGNED	D.P.	07/31/90
ANGLE ±	DRAWN	M.G.	07/31/90
DEC. ± UNLESS NOTED OTHERWISE	CHECKED	W.J.K.	07/31/90
REMOVE BURRS AND SHARP EDGES	APPROVED	CSH	11/09/90
NEXT ASSEMBLY	SUBMITTED	E.J.K.	11/09/90
MASTER	SCALE: AS NOTED	APPROVED BY:	
		APPROVED JOE:	

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS OFFICE GOLDEN, COLORADO

ROCKY FLATS PLANT
P.O. BOX 464
GOLDEN, COLORADO 80402

Remedial Action 881 HS, 881
Effluent Tank Foundation
Plan and Detail

SIZE D | DRAWING NUMBER 38548-307 | ISSUE A | SHEET 3 OF 6

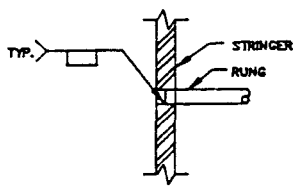
ENGINEERING-SCIENCE, INC.
DESIGN • RESEARCH • PLANNING

1 INCH

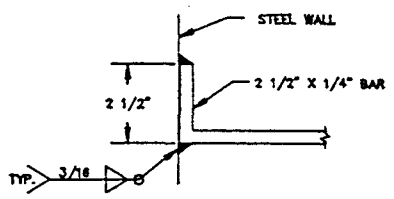
NOTE: THE ABOVE LINE IS EXACTLY ONE INCH LONG AT DESIGNATED SCALE. IF ANY OTHER LENGTH, DRAWING SCALE MUST BE ADJUSTED PROPORTIONALLY.

KEYWORDS

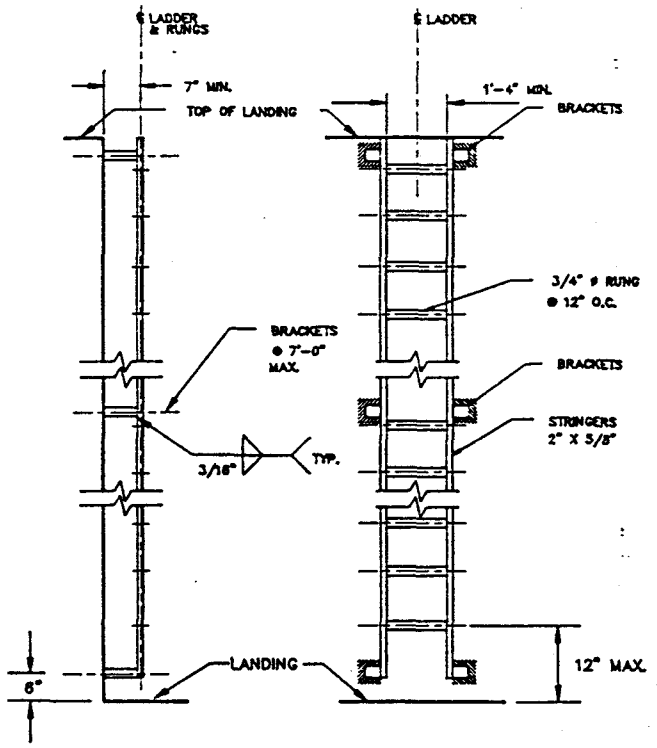
COMPUTER GENERATED DRAWING NO MANUAL CHANGES ALLOWED



TYP. RUNG CONN.



BRACKET DETAIL

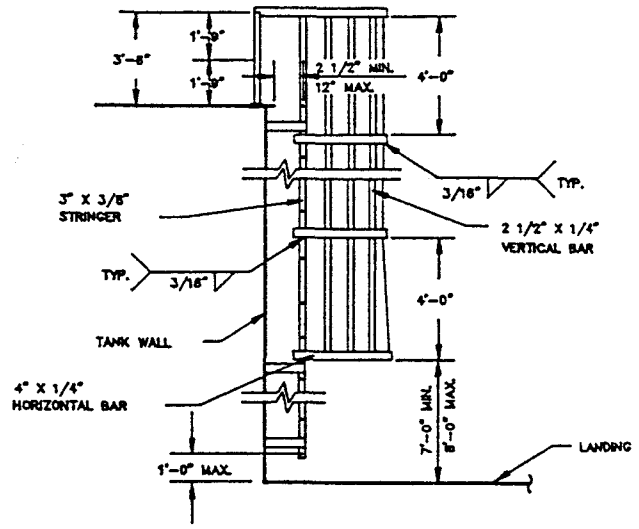


SIDE ELEVATION FRONT ELEVATION

DETAIL 1
LADDER DETAIL

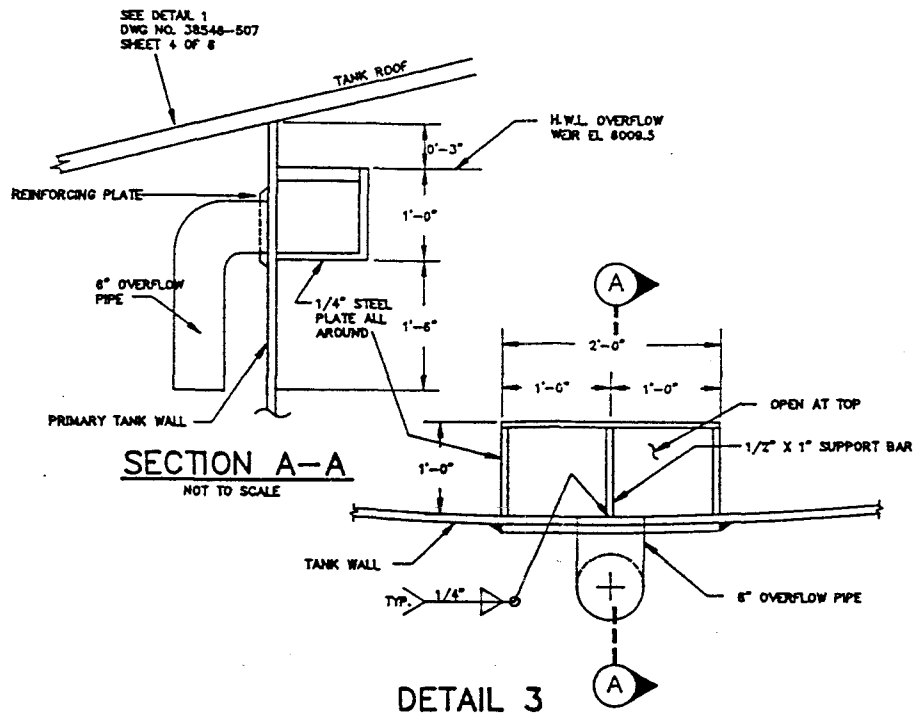
38548-508 NOT TO SCALE

NOTE: 1. STEEL ASTM A36.
2. LADDERS MUST MEET OSHA STANDARDS.



DETAIL 2
LADDER CAGE DETAIL

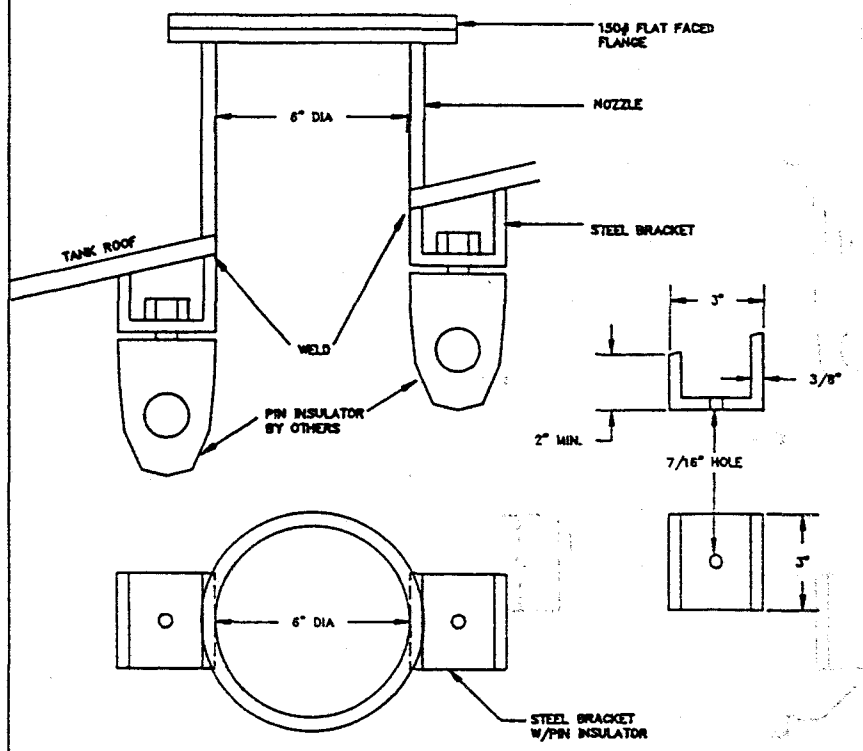
38548-508 NOT TO SCALE



SECTION A-A
NOT TO SCALE

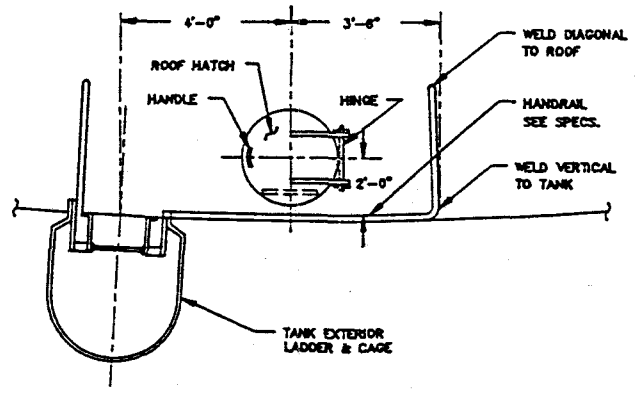
DETAIL 3
PRIMARY TANK OVERFLOW WEIR

38548-508 NOT TO SCALE



DETAIL 4
TANK ROOF NOZZLE (TYP.)

38548-508 NOT TO SCALE



DETAIL 5
EXTERIOR LADDER AND ACCESS HATCH

38548-508 SCALE: 1" = 2'-0"

A	ORIGINAL ISSUE			11/09/90			
ISSUE	DESCRIPTION	BY	DATE	DATE	RFP	DOE CLASS	JOB NO.
	DESIGNED	D-H	07/31/90	U.S. DEPARTMENT OF ENERGY ROCKY FLATS OFFICE GOLDEN, COLORADO			986147
	DRAWN	MAC	07/31/90	ROCKY FLATS PLANT P.O. BOX 464 GOLDEN, COLORADO 80402			
	CHECKED	W.K	07/31/90				
	APPROVED	GSH	11/09/90	Remedial Action 881 HS, 881 Effluent Tank Details			
	SUBMITTED	W.K	11/09/90	SIZE	DRAWING NUMBER	ISSUE	SHEET
	APPROVED: RFP			D	38548-509		6 OF 6
	APPROVED: DOE						

KEYWORDS
TOLERANCES FRACT. ± ANGLE ± DEC. ± UNLESS NOTED OTHERWISE
REMOVE BURRS AND SHARP EDGES
MATERIAL
SCALE: AS NOTED

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COMPUTER GENERATED DRAWING NO MANUAL CHANGES ALLOWED